



FRIDAY, FEBRUARY 11.

NEWS OF THE WEEK.

We give below, in a condensed form, the leading news items of the week. These items will be found in detail in their appropriate columns.

MEETINGS NEXT WEEK.—Rochester & Ontario Belt in New York.

ELECTIONS.—Central, of Georgia, H. B. Hollins, First Vice-President.—Chicago, Lake Geneva & Pacific, John E. Burton, President.—Chicago, Oquawka & Kansas City, John S. Thompson, President; James Harlan, Vice-President; V. M. Blandina, Secretary and Treasurer.—Denison, Bonham & New Orleans, Capt. S. B. Allen, President.—Georgia Pacific, Col. I. Y. Sage, General Manager.—Newburg, Dutchess & Connecticut, John A. Shultz, President; William R. Wells, Secretary; C. L. Kimball, Superintendent.—New York Central & Hudson River, Henry Monett, General Passenger Agent.—New York, Lake Erie & Western, John W. Cloud, General Manager.—Ontario & Quebec, E. B. Osler, President; W. C. Van Horne, Vice-President; C. Drinkwater, Secretary and Treasurer.—Schuylkill Navigation Co., Frederick Fraley, President; Richard Wilkins, Treasurer; F. T. Halliwell, Secretary.—South Florida, Wilbur McCoy, Auditor.—Vincennes & New Albany, Edward W. Watson, President; George Friedman, Vice-President; N. F. Dalton, Secretary; Charles F. Berrian, Attorney; N. P. Hobart, Engineer.—Wabash, St. Louis & Pacific, William Orr, Commercial Agent.—Wheeling & Lake Erie, George F. Forrest, President; D. E. Garrison, Vice-President; M. D. Woodford, General Manager.—Worcester & Hudson, John Gilman, President; Luman T. Jeffs, Vice-President.

PERSONAL.—Died: Hon. William B. Heywood.

EARNINGS.—For January 31, roads report gross earnings, all showing increases for the month.

TRAFFIC.—Anthracite tonnage for January, 1,928,676; Eastern bituminous, 1,060,774; coke, 351,547 tons.—Cotton receipts interior markets, 63,063; seaports, 130,753 bales. Cotton in sight to Feb. 4 was 5,552,154 bales.

CHANGES AND EXTENSIONS.—Canadian Pacific extends its line across the northern wilderness of Maine.—Chicago, Rock Island & Pacific will extend road through Southern Kansas into Mexico.—Chicago, Burlington & Quincy will extend line in Missouri.—Chicago, Kalamazoo & Saginaw will open direct communication between Toledo, O., and Kalamazoo, Mich.—Grape Creek road will be extended to St. Louis, Mo.—Gulf, Colorado & Santa Fe will be extended from Cleburne, Tex., to Weatherford.—Minneapolis, Sault Ste. Marie & Atlantic will begin work at once on bridge across River St. Mary, Mich.—Pontiac & Pacific Junction contemplates extension to Sault Ste. Marie, Mich., to connect with Northern Pacific.—Roma, Watertown & Ogdensburg begins work on the Vincent Place extension in Rochester, N. Y.

LEASES, SALES, ETC.—Denver Circle sold to a New York syndicate.—Chicago, Burlington & Quincy will lease the right of way over the Wabash, St. Louis & Pacific from St. Peters, Mo., into St. Louis.—Minnesota & Northwestern Illinois line, is leased to the Minnesota Division for 999 years.—Wabash, St. Louis & Pacific, Western Division, will be transferred to the new company on March 1.—Terre Haute & Peoria makes a second payment on the old Illinois Midland property of \$600,000.

FORECLOSURES AND REORGANIZATIONS.—Cincinnati & Southwestern will be sold under foreclosure.—Fitchburg assumes management of Troy & Greenfield.—Indianapolis, Decatur & Springfield will be sold under foreclosure.—Lake Erie & Western transferred to Samuel Thomas, Purchaser at foreclosure sale.

NEW COMPANIES ORGANIZED.—Bellingham Bay Railway & Navigation Co. files articles of incorporation at Seattle, Washington Terr.—Hillsboro Branch files articles of incorporation at Madison, Wis.—Perry County R. R. Co. obtains a charter in Pennsylvania.—St. Louis, Wichita, Hays City & Southwestern obtains a charter at Topeka, Kas.—Worcester & Hudson organized at Boston, Mass.

REPORTS AND FINANCIAL.—Atlantic & Pacific for 1886 shows gain of 200 per cent. in passenger business.—Chicago, Burlington & Quincy for 1886 shows gain of 0.6 per cent. gross and 3.1 net.—Chicago & West Michigan for 1886 shows gain of 7½ per cent. gross and 6 net. Dividends, 2½ per cent.—Delaware & Hudson Canal Co. for 1886 shows increase of 5 per cent. gross, and 1 net. Surplus equals 4.8 per cent. on stock.—Delaware, Lackawanna & Western leased lines in New York, quarter ending Dec. 31, show increase of 11 per cent. gross and 7 net.—Denver & Rio Grande Western for 1886 shows gain of 8 per cent. gross and 13 net. Surplus over charges, \$94,798.—Grand Rapids & Indiana for 1886 shows gain of 6½ per cent. gross and 23½ net. Surplus over interest, \$31,323.—Huntingdon & Broad Top for 1886 shows increase of 2½ per cent. gross and 16 net.—Kansas City, Fort Scott & Gulf for 1886 shows decrease of 0.3 per cent. gross, but gain of 7.6 net. Dividends, 8 per cent. on preferred and 4 on common stock.—Long Island, quarter ending Dec. 31, shows gain of 4½ per cent. gross and 0½ net.—Louisville & Nashville, half year to Dec. 31, shows gain of 12 per cent. gross and 20 net.—Maryland Central for 1883 shows decrease of 8 per cent. gross, but increase of 103 per cent. net.—Milwaukee, Lake Shore & Western for 1886 shows increase of 70 per cent. gross and 133½ net.—New York, New Haven & Hartford, quarter ending Dec. 31, shows

increase of 6 per cent. gross and 1½ net. Dividend 2½ per cent.—Northern Pacific, half year to December 31, shows gain of 9 per cent. gross and 8 net; surplus over charges \$826,920.

MISCELLANEOUS.—Buffalo, New York & Philadelphia; court decides against this company in the \$3,000,000 foreclosure suit brought by M. D. Martin and T. D. Locke, as trustees.—Buffalo Freight Committee increases rates on coal, salt and cement.—Canadian Pacific shops at Yale, B. C., consumed by fire.—Central Traffic Association Executive Committee hold a meeting in Cleveland, O.—Chesapeake, Ohio & Southwestern applies to New York Stock Exchange to list \$3,855,000 second mortgage 6 per cent. bonds.—Fort Worth & Denver City will be consolidated with the Denver, Texas & Gulf.—Grand Trunk applies for an injunction to prevent the Canadian Pacific building parallel to their Sault Ste. Marie extension.—Iowa Central appoints committee for reorganization.—Kansas City & Southern is sued for breach of contract in the sum of \$75,000.—Montreal, Portland & Boston Company's books seized by the Hatton party.—New York Arcade Co. is sustained by Supreme Court decision in suit brought by Broadway property owners.—Pennsylvania road is sued for \$300,000 for infringing the Miller car coupling patent.—St. Louis, Iron Mountain & Southern will pay \$250,000 back taxes into the Arkansas State Treasury.—Schuylkill Navigation Co. holds a meeting in Philadelphia.—Toledo, Saginaw & Muskegon will place mortgage for \$1,000,000 on its property in order to complete the line.—Trunk Line Executive Committee restore west-bound rates from Boston and Philadelphia.—Accident at White River Junction, Vt., with great loss of life.

The Handling of Railway Supplies.

(From a forthcoming Treatise on the Subject by Marshall M. Kirkman.)

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(MR. KIRKMAN'S BOOKS.—The question is asked me daily, how I, a busy man working for another, find time to write books in addition to my regular work. The question is pertinent, and I wish to answer it here. All my writings up to this time have referred to my business, and have had for their purpose the advancement of the interests of my employer. If he has derived no benefit therefrom, then I have simply fallen into the mistake made by so many railroad men of over-estimating my services in his behalf. And in reference to the immediate scope of my writings, they are intended, it is proper to say, wholly for the young and advancing class among railroad men; for those who lack opportunities of learning; for those who desire to know the subtleties of railroad affairs yet are prevented by their restricted position. The interests of railway companies require the widest diffusion of knowledge among this class, but unfortunately, there are no present opportunities by which it may be acquired except as they pick it up piecemeal, here and there. These books are intended, so far as their limited scope applies, to supply this deficiency. The managers of railways have no wants in this direction, and I have never been able to write anything that I thought worthy their regard. The great talent and opportunity of this class make their knowledge cosmopolitan; make them teachers; and no prudent railroad officer or practical manager, I have noticed, however, that the general knowledge of railway affairs possessed by managers had a tendency to make its expositors appear to them unnecessary, a work of supererogation. This is the natural error that men fall into whose appetite is losing its elasticity through over-use or lack of exercise, the error of successful men, of men whose ambition is gratified. They forget that the stale platitudes of to-day were to them the hidden mysteries of yesterday; that what is common-place to them, is the source of the liveliest curiosity to their less favored brethren.—M. M. K.)

In order to bring the subject that I propose to discuss within the space I can devote to it, I shall restrict myself to a particular kind of railway property, namely, the supplies that are necessary in the operation of these enterprises. These supplies constitute personal property, nevertheless they are in the nature of a permanent, fixed investment. They have a current value in the market, yet they are not available as an asset (except in the sense that the right of way of a railroad is an asset), for the reason that a property cannot be operated without them any more than it can be operated without a track. They are, therefore, to be viewed from the standpoint of the latter. They cannot be disposed of and cannot be slightly diminished in amount. The custom in regard to the disposition of this description of assets is not uniform. It is not the practice in America as a rule, to capitalize these investments. The reason of this mission is that the amount is fluctuating, and in the early history of every enterprise the sum is small and its future dimensions so difficult to be calculated that its importance is overlooked and disregarded. The amount of material that it is necessary for a company to keep on hand to meet current wants depends largely upon the character and extent of its property and business. It is, however, more likely to exceed than to fall short of five hundred dollars per mile of road. If the business of a company is large it would greatly exceed this sum; moreover, if it is necessary to keep on hand a large supply of fuel, the amount invested will be increased to that extent. The estimate of five hundred dollars per mile is based on the supposition that a company is able to procure fuel from month to month as required, and that it does not keep on hand more than a month's supply.

The cost of railway supplies on hand, owned by the various lines, represents an enormous sum, and probably approximates over seventy-five millions of dollars.

What disposition is made of this property? What safeguards are thrown around it to prevent its deterioration, misappropriation, or wasteful use? These questions I cannot hope to answer, except partially. The subject is too large to be compassed within a single interview. Its full elucidation must represent the wisdom and experience of many men, and will be, therefore, a work of time. Nevertheless, I shall describe, so far as my knowledge and limited time will permit, some of the things that is desirable should be more generally known leaving it to others more competent to supply my omissions and correct my mistakes.

The supplies of a company represent cash. It costs cash to replace them. They should, therefore, be guarded with equal intelligence. This is not usual; the reason is that the use rather than the value of the merchandise is considered. If a company loses a package of money, the fact is bemoaned by a whole continent; the associated press recognizes its importance; the telegraph resounds with its details; local reporters exert themselves to ascertain particulars; the delinquent is publicly reprimanded, very likely disgraced. If the money is stolen, myriads of detectives pick up their ears in anticipation of the reward. If the agent of a railroad is discovered to have embezzled a few dollars, the whole official staff trembles with suppressed indignation and no stone is left unturned to secure a return of the money and the dismissal of the delinquent. This is not the rule in regard to material. It is probable that such losses in the majority of cases, are not known at all, even by those immediately in charge. If the loss occurs through the improvidence or neglect of a store-keeper or person in charge, certainly it is never

known by any one but himself. Why? Because of the methods of handling material.

The amount of material at any designated point is, to a certain extent, an unknown quantity. The methods of storing and disbursing are so imperfect that absolute precision, as in the case of cash, is impossible. Hence, if there is a surplus or deficiency when the inventory is taken, it is adjusted in the accounts without remark, unless excessive or peculiar. The rule, therefore, that governs in the case of cash does not apply with regard to material. It is probable that those in charge of material are quiet as honest as those who handle cash, but the property entrusted to their care is subject to certain extraneous influences that cash is happily free from. This fosters improvidence, carelessness of thought and action in connection with it, and while any known offence is punished, discovery is not absolutely sure as it is in the case of loss or misappropriation of money. This is demoralizing. It makes men forget or ignore the fact that property of this nature has the same value to a company as cash and that its destruction or improper use is equally disastrous.

In order to secure necessary and proper safeguards in the handling of material, we must consider it from the standpoint of value solely. To misappropriate or waste it must be esteemed the same as the misappropriation or loss of money. Its deterioration through lack of proper care must be looked upon the same as any other offence against good business usage. Its loss must be thought the same as the loss of money. It is no exaggeration to say that a cashier who would use a drawer that contained checks through which more or less of his money was lost, or that was too small to accommodate the supply, or who stored his surplus cash on window sills and in public entries, would be considered improvident in his methods of business. The losses that transpire in connection with the material of a company that are avoidable, within just and reasonable limits, are as inexcusable as the loss of money would be under the circumstances named. The disparity that exists between the care of property and the care of money is almost ludicrous, not only upon railroads but everywhere else. Our money we watch with unceasing vigilance; when we receive it we count and recount it, examining it meanwhile with eye and tooth. While it is in our possession we store it in costly vaults and in safes at once the pride of the safe man and the despair of burglars. When we pay it out we count and recount it as before, and at the close of each day particularize our payments and sum up that which we have on hand with the utmost precision, lest a penny should have escaped, or a surplus penny, somehow or other, have crept into our possession. This care is not exaggerated. It is the result of experience, of necessary precaution. What are the practices in regard to material? Is the same provision made for it that the merchant and manufacturer practice? Hardly! We endeavor to inspect it when it is received, but in consequence of the lack of proper facilities for handling many counterfeits are palmed off upon us. When received, we do not place it in costly vaults or safes, nor even behind oaken doors or carefully barred windows. The smaller articles we place in what we call a storeroom. This storeroom is, however, in many cases, nothing more or less than a few shelves loosely constructed in a round-house, or a partition thrown across a corner thereof, without adequate locks or bolts. If the supply of material is large, a special room is assigned. But this room, in the majority of cases, is much too small, and its internal arrangements ill adapted to its purpose. Whatever its character, we use it only to store small supplies. The great bulk of the material lies scattered about the various buildings and yards. Some of it is waiting to be used on the morrow; some of it has been "stranded," so to speak, awaiting the attention of the storekeeper. It is more or less scattered in any event, because there is no convenient place provided for it. All of it is suffering more or less deterioration. Some of it is partially destroyed. Some of it wholly ruined while the more volatile oils impregnate the earth with their moist drippings, and perfume the air with their offensive odors. The picture is not exaggerated. There are, of course, exceptions. I have in mind store-houses constructed recently in the light of our experience and known wants that are in every way adequate. These are the exceptions, however. The blame does not attach to the railroad managers of to-day. It long ante-dates our time. Innumerable reasons tend to perpetuate it. The scant thought devoted to the subject originally by those who planned our shops and depots of supply strike the observer with amazement. If, when we paid money into a bank, it were necessary for the teller to crawl over a contiguous counter, through an open window, past a long line of men engaged in various occupations, in order to reach his money drawer, we should say that the bank was poorly planned, if economy in its working and safety in the care of its funds were desirable. Yet the practices in regard to the handling and storage of material in many instances is not any more surprising than the case cited. And what is more remarkable still, is that it excites neither surprise nor suggests correction. It is probable that the illy conceived, and more meanly executed, system of railroads for handling material grew out of the division of responsibility primarily in regard to the matter. The system sprung up, like "Topsy," without method or forethought. Where our shops were planned by an engineer, it is probable that he was not called upon to make any provision whatever for supplies, or, if he was, the warehouse was inconveniently located. The rule has been to construct the store-houses out of remnants, not with reference to convenience of unloading, storing and disbursing, but rather with regard to an unoccupied spot, a place apart, something "remote, unfrequented, melancholy, slow!" While the most elaborate provision has been made for equipment and machinery, the store room for supplies has been forgotten or ignored. Nothing could exceed the commodious and convenient character of our machine shops and roundhouses or the minute care that has been exercised to see that all the parts harmonize exactly with the use that is to be made of them. Every device by which economy of labor and the protection of the plant could be secured has been carefully considered. These are only necessary and proper precautions. The same standard of excellence should have been observed in regard to the supply stores. The standard should be the standard of private practice.

It does not require any extended or technical knowledge of railway affairs to teach us that the same care should be observed to protect railway supplies that a provident merchant uses to protect similar merchandise. To the extent that this is neglected, we are remiss. The occasion of this remissness may excuse it, but it does not alter the conditions; to say that it is the result of lack of forethought and not of design, of inexperience and not of deliberate improvidence, does not make the loss any less. We ought not to expect, however, the same high standard that the merchant exhibits. His intelligence is heightened by the instinct of ownership; the instinct of hered-

* The truthfulness of this picture will, I think, be recognized. It is wholly general. Indeed, I may say in this connection, that nothing said in this book, or indeed in any book or pamphlet that I have ever written, has other than a general application. It is intended to meet other than general conditions, wherever these general conditions are recognized, therefore, they may be accepted as common, though not necessarily universal; they are never in any sense personal or peculiar and are not intended to have any particular application to properties, places, times, or men.

M. M. K.



DERAILMENT OF STEAM-HEATED CARS AT FREDONIA, N. Y.

ity; the instinct that one merchant hands down to another. Those who operate railroads have not the habits of merchants, nor their personal incentive. This does not imply that they knowingly or wilfully omit any precaution or violate any law of ethics. The standard of morality among them is, probably, quite as high as it is among merchants. It is, however, less effective in its methods, that is all.

In individual cases great progress has been made in the manner of handling material; particular companies have given the matter elaborate thought and fit expression. These are the exceptions. Moreover, proper provision is, in many cases, impossible at the present time. The room is lacking or the arrangement of shop buildings prevent it. Originally, the considerable cost that a store-house involved, rendered it expedient to get along without it, and seemed to excuse the neglect to make provision for one afterward. This is the reason why we are without store houses to day where we should have them, or why they are located with so little intelligence or so little adaptability to their use. That such economy was not justified, no matter what the circumstances of the case might have been, no one familiar with the subject need be told, but unfortunately criticism avails nothing. In the inception of our present great companies, the poverty that enveloped them knew neither time nor utility, and it sacrificed in its improvidence, both present and future. That the saving on the outlay would have abundantly justified the apparent extravagance we now know. But no criticism can remedy the inherent evils that follow the original neglect. They are irreparable. Intelligent study of the subject may, however, it is hoped, ameliorate the conditions, even at this late day, and it is the belief that this is so that suggests reference to the subject here.

Not the least of the losses that a company suffers through improper methods of storing its material, is the demoralization that it engenders, the suggestion it affords the unstable to appropriate that which they see so lightly esteemed; of the improvident use of material that is seemingly of so little value; of the disposition it inculcates to multiply losses by ever-increasing neglect; of the imperfect knowledge of the supply on hand that it engenders; of the excessive orders that must grow out of this ignorance; of the impossibility of enforcing proper responsibility in the disbursement of material; of the lack of care in sorting and disposing of old material; and, finally, of the loss of personal responsibility it engenders.

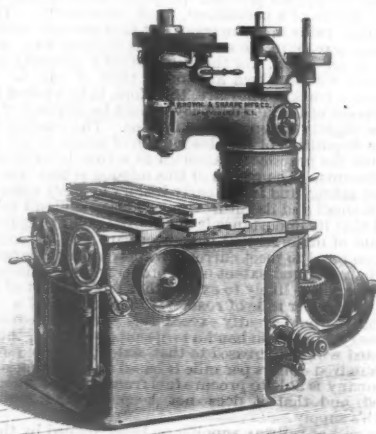
No company can be so poor as to justify neglect to make proper provision for handling its supplies, to protect them from the elements, to throw around them such safeguards as are necessary to prevent their loss or improvident use. For those articles that have a general current value, such as copper, brasses, and tools, secure store-houses must be provided with every needed facility. For oils and kindred substances, capacious tanks should be provided, in which they may be securely stored, and from whence they may be drawn without waste or unnecessary labor as needed. For bulky articles that cannot be carried away surreptitiously, simple sheds are all that is needed. For old material and scrap, room is needed first, for assorting, and afterwards for protection and security. Provision for storing should, in fact, be such as an owner would provide under like conditions. The value is the same, the risk that attends neglect the same, the cost of replacement the same. This is not only true in regard to the supplies about the general shops and round-houses, but it is also true in regard to the material that is scattered along the line, whether new or old. Every section should not only have a place in which to store its tools, but it should have a secure place in which to store supplies and worn-out material. It is necessary to save them from loss and depreciation, but it is also needed to enable the foreman in charge to render an intelligent account of the same.

Derailment of Steam-Heated Cars, Fredonia, N. Y.

The engraving which we publish herewith is from a photograph (taken soon after the accident) of the position of the combination car as it lay after being thrown from the track by a broken switch-rod on the Dunkirk, Allegheny Valley & Pittsburgh road, Jan. 6. The accident occurred at Fredonia, N. Y., and the descriptions indicate that the car behind this

was derailed first, and, following the side track, had its direction sharply turned to one side, so that when it stopped it stood at an angle of about 45 degrees with the main track. It apparently helped to pull the combination car over on its side, as shown in the engraving. The chief interest in the case centres in the peculiar way in which the doors and the stove of the combination car behaved; and a look at the circumstances readily confirms the view expressed by competent witnesses that but for the fact that steam heat (the Martin system) was in use on the train (in place of stoves which were still in the cars, but disused), the cars must have been burned.

The partition between the passenger and baggage compartments was about midway of the car, and close to it on the passenger side, in the corner, which in the engraving is on the upper side, stood the ordinary cast-iron stove bolted



Vertical Spindle Milling Machine.

Made by the BROWN & SHARPE Mfg. Co., Providence, R. I.

down; and its contents, consisting of cold ashes and half burned coal, were precipitated to the other (lower) side of the car; so it requires no stretch of imagination to believe that a lively fire would have been very promptly kindled if the coals had been burning. In the baggage compartment were two men; and, curiously, the outside end door and the free side door were both warped or blocked in some way so that they could not be opened. The men got out by kicking through the door into the passenger compartment (close to the stove), and a consideration of the substantial manner in which car doors are generally made may well give color to the statement that ten minutes elapsed before the prisoners got free. Of course, various circumstances might have conspired to save the men even if there had been a fire, but the lesson is plain enough, nevertheless, and it is to be hoped that those who still love the ancient stove for its unpretending manners, and hug it affectionately for the good it has done, and those who dwell complacently on the fact that cars are very safe places to be in, in spite of

their occasional little idiosyncrasies in the crematory line, will profit by it.

Vertical Spindle Milling Machine.

The accompanying illustration shows a machine recently introduced by the Brown & Sharpe Mfg. Co., of Providence, R. I.

This machine, for many of the operations of milling, has some conveniences over those having a horizontal spindle, as the work can often be both more conveniently placed in position and more easily seen.

It is, of course, especially suited for the various operations of milling which can be done with an end or face mill, the work being held upon the platen, and the spindle standing vertically, the operator can plainly see and guide the work, and follow any irregularity of outline of any raised surfaces to be milled.

The platen is 36 in. long and 12 in. wide, with tee slots for convenience of holding work, and has hand or automatic longitudinal movement of 36 in., and a transverse movement of 12 in. in either direction.

The spindle has long and large bearings, with means of adjustment for wear. It has a hole throughout its length, through which a bolt is passed for holding the arbors. The end of spindle at its lowest point is $1\frac{1}{4}$ in. from platen, and at its highest 15 in., the adjustment being made by the raising of the column, a fine adjustment being obtained by a graduated collar nut reading to thousandths of an inch. It has three belt and three gear speeds, which, with two speeds of counter, makes twelve speeds.

The feed is automatic at will, in either direction, stopping automatically at any required point, and has six changes for each speed of spindle.

The weight of the machine complete is about 3,300 lbs.

The Gravity Lock Car Seal.

The accompanying illustrations represent a form of car seal that has been lately introduced by the Gravity Car Lock and Seal Co., of New York. This lock is in use on the Cincinnati, Hamilton & Dayton, and is, we understand, giving much satisfaction.

The construction is simple and is easily understood from the accompanying drawings. The pin is made of malleable cast iron, and has a hollow shank. A plug of rubber and two balls are placed in the hollow, the lower part of which is closed by an iron plug, which prevents the balls falling out. The end of the shank of the pin is then hammered down over the plug, and keeps it in place. The tapered appearance of the lower portion of the pin as shown in the illustration is produced by being thus closed to retain the plug. A slot is milled through the pin, and a piece of hoop iron $\frac{1}{4}$ in. by $\frac{1}{8}$ in. thick is inserted through the slot beneath the small balls, see fig. 2. The balls are thus forced up against the rubber, which, being compressed, shoots the balls downward into the peculiar slot in the hoop iron, which is thus locked in place and cannot be dislodged without breakage, see fig. 3. This piece of hoop iron, which is shown in fig. 4, forms the seal.

Fig. 1 shows the position of the pin and seal when a car is sealed.

The view, fig. 5, is a cross section through the pin and seal, and shows clearly how the balls lock the seal and prevent its

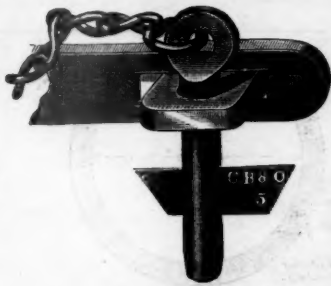


Fig. 1.

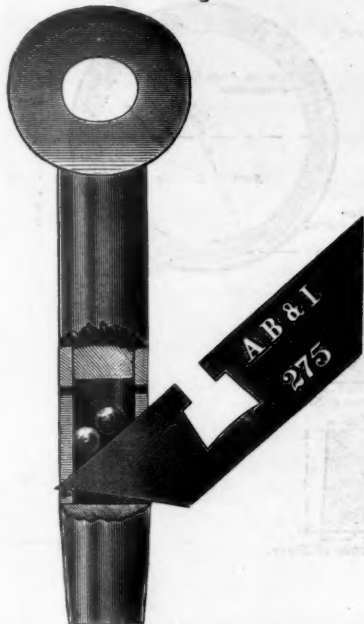


Fig. 2.

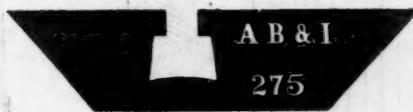


Fig. 4.

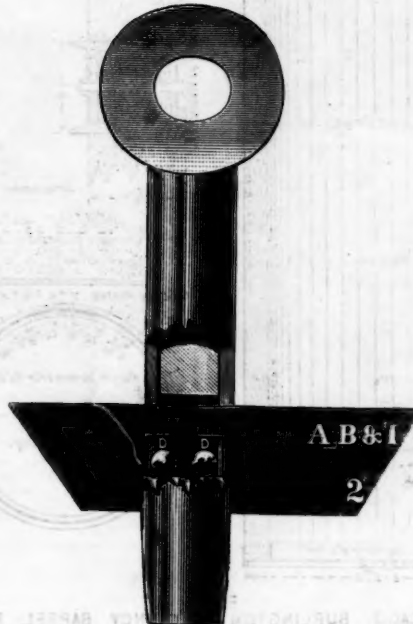


Fig. 3.

GRAVITY CAR SEAL.

withdrawal. As at first made but one ball was used, but this could be jerked upward by a blow on the bottom of the pin and the seal could be withdrawn before the ball could again fall through the slot. With the present construction the two balls when jerked upward both start together, and as they cannot both get through the slot at the same time, one remains behind and locks the seal. Generally, however, both



Fig. 5.

would strike the top of the enlarged portion of the slot in the seal and fall again together.

A round hole can be made in one end of the seal so that it can be strung on a wire with other seals. The initials of the road and any other marks can be stamped upon the other end of the seal.

When it is desired to enter a car sealed with this device, the seal is broken with a sharp blow struck down on the lettered end of the seal.

It would appear impossible to remove the seal without breakage, even if the plug in the bottom of the pin could be withdrawn.

French Experiments on Riveting.

Mr. Considère has given in the *Annales des Ponts et Chaussées* the results of a series of experiments on the additional strength obtained in riveted connections by the frictional resistance—adhesion—caused by the shrinking of the rivets.

In the first table, given below, the rivets were placed in drilled or punched holes somewhat larger than their own diameter, a washer plate with a hole of the rivet diameter being superposed on each side to secure a good hold of the rivet on the plate.

Rivet holes.	No. of test.	Strain causing first slip.		Strain causing rupture.	
		Total lbs.	Per sq. in. of rivet section.	Total lbs.	Per sq. in. of rivet section.
Drilled $\frac{1}{8}$ in. diam.	1	19,360	19,933	22,418	48,214
	2	16,236	16,720	22,198	45,757
	3	11,264	11,600	16,098	35,100
Average.....			16,086	42,357	
Punched $\frac{1}{8}$ in. and reamed to $\frac{1}{8}$ in.	4	14,784	15,270	12,705	29,189
	5	13,310	13,714	23,006	48,657
	6	15,500	17,000	21,054	43,400
Average.....			15,314	39,414	
Punched, upper edge against smooth surface.	7	18,700	19,272	24,200	49,886
	8	16,900	17,457	19,600	40,586
	9	16,852	17,357	21,604	44,529
Average.....			18,029	45,000	
Punched, upper edges against each other.	10	20,108	20,714	19,250	39,671
	11	21,384	22,029	22,792	46,792
	12	19,800	20,400	20,350	41,943
Average.....			21,047	42,857	
Punched, smooth surfaces together.	13	17,000	18,129	20,790	42,857
	14	17,688	18,272	21,290	43,900
	15	18,040	18,586	19,250	39,671
Average.....			18,259	42,143	

In the above table only the moment when slipping began, as noted by a mark on the edge of the plates, and the ultimate resistance of the rivet were noted; but in the next three tables the relative amount of slip under different pressures and at different riveting heats, were noted, the results being very interesting, as showing the advantage of a decidedly low temperature of rivet in securing adhesion. The slipping in these latter experiments was read from a scale and pointer which exaggerated the actual movement 100 times.

In the first two tables the rivets and pins were all cut out of the same bar of No. 5 Creusot iron 11-32 in. in diameter.

The rivets used in getting the last table were all of the same iron, giving by the tests of tensile strength resistances per square inch of 56,520, 55,810, 57,368 lbs. per square inch, and elongations of 20, 26 and 22 per cent., respectively.

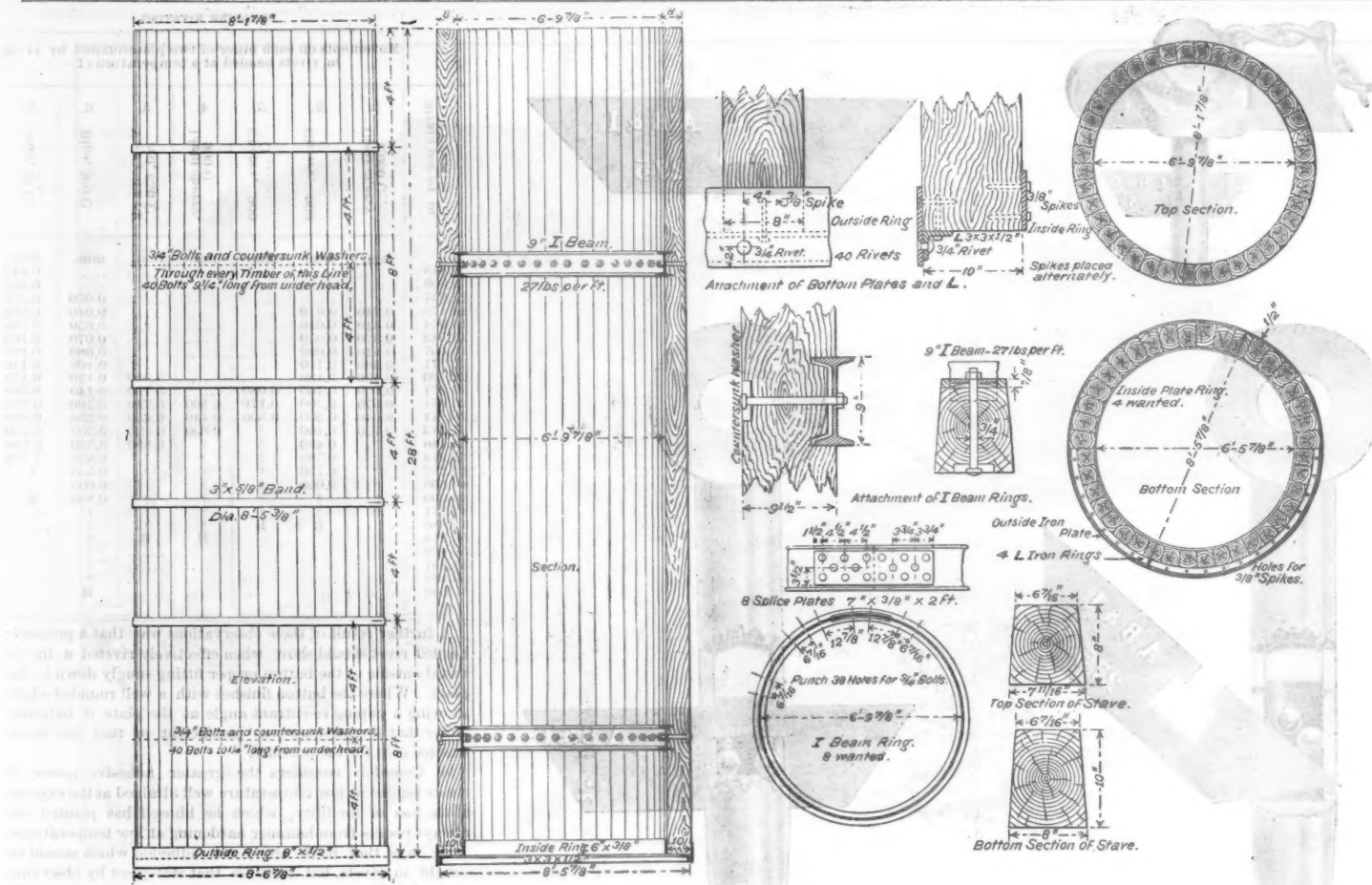
Instead of leaving the rough punched edge on the rivet-holes in the last three tables, the edges were carefully removed and the smooth surfaces brought together.

In the last table it is noticeable that with the large rivets, where the riveting pressure fell as low as 100,000 lbs. per square inch, the low heats did not give as good results, and further experiments with small rivets and the same rivet pressure showed the same result, the obvious deduction being the advantage of low temperature and high pressures in these operations, so far as adhesion is concerned.

HAMMER RIVETING.

Movements on arbitrary scale of plates held together by—

Strain sustained per sq. in. of rivet, lbs.	A $\frac{1}{2}$ in. rivet headed at temperature of—								A pin.	
	1. Clear cherry, 1,000° C.	2. Cherry, 900° C.	3. Dull cherry, 800° C.	4. Dark red, 650° C.	5. Fading red, 550° C.	6. Red just gone, 500° C.	7. Blue, 400° C.	8. Cold, 28° C.	Plain cold.	Upset cold.
0	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
7,300									0.000	0.000
10,557									0.070	0.070
13,814							0.003	0.240	0.850	0.700
15,443						0.005	0.430	0.710	0.885	0.700
17,071	0.007	0.110	0.072			0.012	0.500	0.550	0.910	0.715
18,700	0.008	0.190	0.085			0.015	0.600	0.680	0.940	0.720
20,329	0.020	0.297	0.102	0.004	0.016	0.023	0.690	0.800	0.970	0.725
21,958	0.020	0.270	0.144	0.030	0.032	0.041	0.710	0.930	1.030	0.735
23,586	0.205	0.270	0.144	0.030	0.032	0.041	0.800	1.090	1.130	0.790
26,829	0.330	0.350	0.205	0.200	0.090	0.065	0.880	1.150	1.260	0.920
30,071	1.100	0.520	0.460	0.480	0.070	0.076	0.940	1.180	1.530	1.370
33,300	1.340	0.800	0.760	0.680	0.085	0.078	1.000	1.300	1.590	1.600
36,543	1.520	1.040	0.840	0.830	0.100	0.087	1.035	1.380	1.700	2.120
39,771	1.	1.200	1.070	1.030	0.110	0.090	1.070	?	?	?
43,014	2.000 R	R	?	?	0.120	0.110	1.100	?	R	R
44,043			R	?	0.130	0.120	1.170	?		
46,257				?	0.140	0.132	?	R		
49,509				?	0.190	0.157	?			
52,743				R	0.490	0.190	?			
54,371					1.040 R	0.210	R			
56,000						0.230				
57,614						0.310				
58,271						0.490				
58,920						R				

Fig. 2.
CHICAGO, BURLINGTON & QUINCY BARREL PIER.

same reduction of adhesion would not eventually take place even if the pressures were kept far below that sufficient to slip the plates with a single pressure.

It is to be regretted indeed that M. Considère did not prolong his experiments in this direction, so important to the durability of swing-bridge members, for instance.

So far as his experiments went, and indeed on the general consideration of the uncertainty of rivets remaining tight, the general practice of depending on the shearing strength of rivets and not on the adhesion of the plates caused by them seems entirely justified, and, therefore, as above remarked, the main consideration in riveting should be the filling of the holes and the conservation of the ductility of the rivets, which are best attained by great pressures and high riveting temperature.

M. Considère says that the rivets in French bridges, having regard to the pressure on the walls of the rivet holes, are usually proportioned to be double in diameter the thickness of the thickest plate held, but this rule is limited by avoidance of too many different rivet sizes in the same work.

On the other hand, in French naval construction the rule followed is according to the thicknesses assembled, influenced by the necessity of tight joints in the hull and in boilers.

	Hundredths of an inch.											
Thickness of collective plates riveted together.....	11	23	31	39	47	55	63	71	79	86	102	118
Diameter of rivets for iron plates.....	31	47	55	63	71	79	87	95	102	110	126	
Diameter of rivets for steel plates.....	31	55	71	79	87	95	102	110	118	134	

These dimensions are for rivets in single shear. For rivets in double shear it has been proposed to use diameters of one-half those for single shear.

An interesting result of M. Considère's experiments is the fact that while punching seriously injures the strength of steel, the use of the drift-pin has decidedly the contrary effect. M. Considère explains this on the assumption that the cause of the weakness from punching is the incipient cracks produced around the hole and the violent straining of the fibres adjoining the same. Neither of these effects takes place in drifting, the metal being simply crowded up and made more compact.

There is, however, in drifting an improper transfer of the strains on the material, so that reaming out the holes retains its position as the best method of correcting there eccentricity, and the sole defect of that process,—the enlargement of the hole over the size of the rivet,—is remedied by the swelling of the rivet in pressure riveting.

Chicago, Burlington & Quincy Barrel Pier.

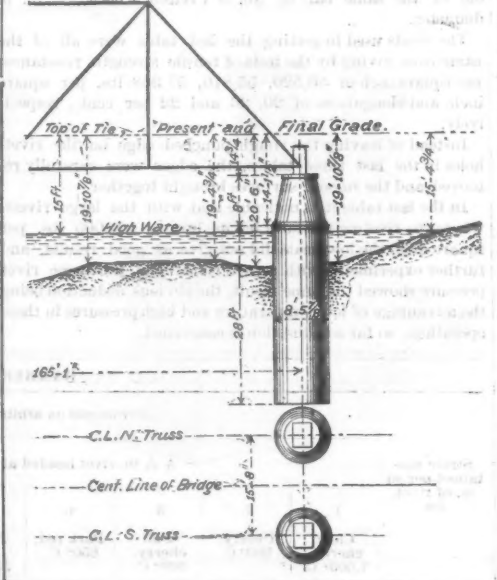
The Chicago, Burlington & Quincy, in renewing its old pile piers and wooden bridges, put in their places stone piers and iron bridges. Where the piers were on rock foundation they have remained in good condition, but where, as was largely the case in Iowa, rock foundations cannot be had, recourse was had to pile foundations, two feet in depth of concrete being put in around the heads of the piles.

The masonry carried up on these foundations has given a

great deal of trouble by shaking to pieces under the vibrations of the trains, notwithstanding the very high class of the masonry, most of which was put up by day labor under the supervision of the company's own foremen. The cost of driving piles for the foundations was found to be very high, as in many cases a track driver had to be used and had to be kept out of the way of trains, which on a single track road doing a large business is a serious matter. The temporary work to carry trains was also found to be expensive, as a slow order could not be enforced against a full freight train that had to make a run for a hill. The work done at the bridge whose piers are illustrated in this number is an attempt to reduce the cost of foundations and to find a substitute for masonry. The advantages claimed for the wooden caissons are that they can be put in without interfering with traffic and that no time is lost by the men employed in sinking them, as they do not have to stop work to allow trains to pass.

The caissons shown by figs. 1 and 2 are sunk by excavating from the inside. If their own weight is not sufficient to sink them they are forced down with jacks or loaded with the weight of the track and passing trains. The caissons are filled with concrete up to the bottom of the lower I beam ring. Between the I beam rings sand filling is used. Planking is placed under the lower I beam ring and is intended to distribute some of the load over the surface of the concrete.

On top of the wooden barrel sunk as above described is placed an iron frame, as shown by a general front elevation in fig. 3, and in more detail by the sections, elevations and

Fig. 1.
Chicago, Burlington & Quincy Barrel Pier.

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On top of the wooden barrel sunk as above described is placed an iron frame, as shown by a general front elevation in fig. 3, and in more detail by the sections, elevations and

plans in figs. 4 and 5, on which iron frame the trusses for the bridge are seated.

As soon as the wrought iron sub-pedestal is in place the upper part of the caisson is filled with concrete, the ground in front of the caisson protected with rip-rap and a sufficient quantity of concrete put around outside of caissons to protect the timber. A stone or concrete retaining wall is built behind the caissons to retain the end of the bank.

Piers of this kind were put in at bridge 345A in 1884, and have given satisfaction.

The design shown by our cuts is for bridge 342A, viz., the first bridge after the 342d mile post.

Contributions.

Walking on the Railroad Track.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I notice that you rather poke fun at the Railroad Commissioners of my native state for enunciating gravely the proposition "that it is dangerous for people to walk upon the railroad track."

Now I don't quite see that they have done anything very ridiculous. All their future decisions as to accidents cannot contain as true and important an axiom.

They have begun well, by trying at least to teach a great moral lesson which is much wanted. If people would only heed this warning, thousands of lives would be saved. The general public have a perfect and inexplicable mania for walking on the track, while an old railroad man, like myself, hates nothing worse than to have to stumble over ties, with the chance of collision with a monster one thousand times my weight. Put me on the footboard, and, if I do pitch into something, I have at least a chance. I can do the other fellow some harm, even if I get hurt myself. But walking on the track, I haven't a show. And I do hate an unequal contest. There is no fun in it, and that is just what is the matter with walking on the track. It is not an agreeable path if you escape, and if you get hit I suppose it is worse, but I have never been quite there, though near enough to give me a decided opinion on the subject. Walking on the track ought to be prohibited by law and punished by a week's work cleaning car axle boxes, or washing out boilers, or some such light work as would cause the track-walker to pause and reflect before he did it a second time. A GREEN MOUNTAIN BOY.

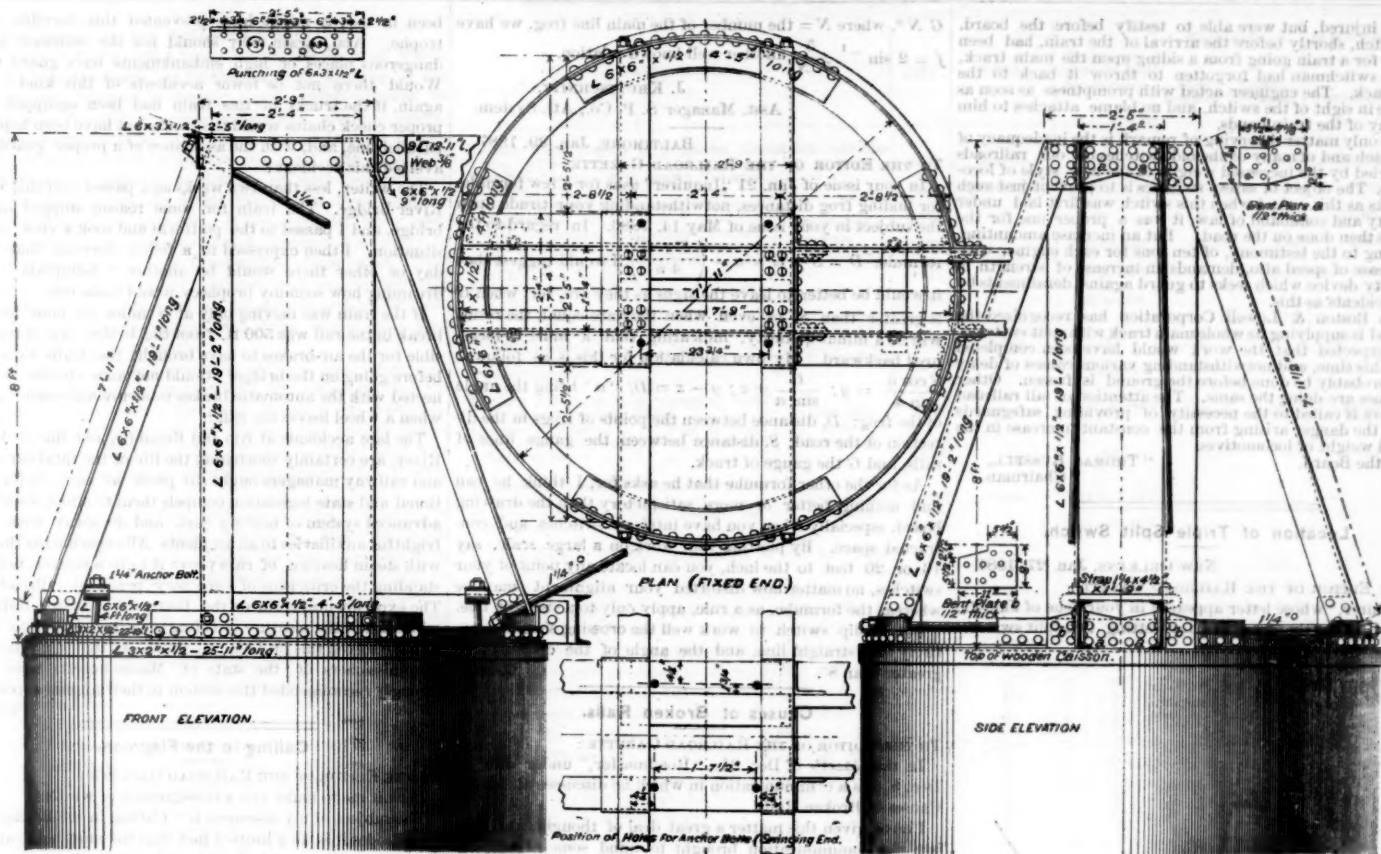
[Our correspondent seems to have misapprehended our remarks. If he will read them carefully, he will see that we commended the Vermont Commissioners for announcing a broad general principle; and for doing it in a manner at once clear and concise. What higher praise could an editor give?—EDITOR RAILROAD GAZETTE.]

Farrell's Bandless Spring.

GAINES, Worcester, England.

TO THE EDITOR OF THE RAILROAD GAZETTE:

This form of spring illustrated in your issue of Dec. 31, 1886, is not quite new, as in a paper read by me before the Institution of Mechanical Engineers, Jan. 23, 1850, I described a simple form of bandless spring for coal and other wagons (freight cars). Very many thousands were applied



CHICAGO BURLINGTON & QUINCY BARREL PIER.

and with every success, effecting an economy in first cost and in weight.

The invention later on was squashed by a regulation of the Midland Railway (England) that all coal wagon springs on private owner's wagons working over the line should not be under a certain length.

Dispensing with the band shortened the spring in its heaviest part to that extent, hence the economy in cost and weight. When there was no longer an economy in first cost, the incentive to push their use ceased, English railways then, as now, paying little attention to the question of dead weight in rolling stock.

The paper above referred to, and also a supplementary paper read before the same institution on April 24, 1850, contained a full account of the principle and practice of

spring making, and might be worth the perusal of your readers.

W. A. ADAMS.

W. A. ADAMS.

McKeen Car Coupler.

EASTON, Feb. 7, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

If I may be allowed to refer to your criticisms of my letter in the last number of the *Gazette*, I would say that a practical test of the merits of the two types of couplers is just what I would like to see made, and I think if you notice what I said in reference to Mr. Goodwin, you will see that I had no idea of its being managed by the patentees of car couplers or in their interest. I am aware that some of the things I said are a matter of opinion, and if I am proved to be wrong in a fair

and systematic trial, no one will be more ready to acknowledge it than I am.

I did not think a train of passenger cars, consisting of ten or twelve at the most, would not pass readily around a curve, but I do think a train of 30 to 40 loaded freight cars with hook couplers, even if started on a straight piece of track, and not under full speed, would be much more difficult to pull around a sharp curve, than would the same number of cars with link couplings.

I will admit that a train fitted with blocks in the links would pass freely around a curve, and that is one reason why I think that any test should be made, not with the blocks in the links, but with the "hook couplers" themselves, and in such a thorough and satisfactory manner that it will settle the matter for all interested.

I think, however, you have struck the key note in the few last sentences of your editorial in the "Car Coupler Tribunal," in these words :

"Automatic action is chiefly valuable, because it necessarily implies greater safety. As the men need not go between the cars they escape the greatest cause of injury. But an equal degree of *safety* by a *coupler* which, though not self-acting, can be worked without going between the cars,

"Such a coupler would at least enable all cars to be *safely coupled*, whether fitted with *automatic couplers* or not. It would thus bridge over the gap until automatic couplers of the same type are universally used."

These are exactly the grounds I have taken on the coupler question, and as soon as there is a strictly automatic coupler that meets the requirements and has been tested in actual service, I am ready to leave the field. T. L. McKEEN.

T. L. McKEEN.

Safety Switches.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The following is the law in regard to safety switches in Massachusetts:

"General Railroad Law, Sec. 159.

"All switches hereafter laid on a railroad track, used or intended to be used by passenger or mixed trains, including those so laid in renewal of existing switches, shall be of the kind known as the *Tyler Switch*, or of some other kind of safety switch, approved in writing by the Board."

Nothing has done more to retard improvement in the maintenance of way departments of railroads in this state than this law in regard to safety switches. As an evidence of the fact in the rapid march of improvement in railway appliances, see this relic of the early days of railroads in general use on Massachusetts roads to-day. Its use is lawful. Talk about misplaced switches, whenever it has been placed in main track for the last twenty years it has been misplaced.

Great efforts were made and a hearing before the Legislature to have the law repealed, but without avail. If the truth was known, this switch is the cause of more accidents than any other railway appliance in use. The best roads in the country discarded it twenty years ago. Here is the latest from the Board of Railroad Commissioners of Massachusetts.

"The derailment of an outward-bound passenger train at Winchester on the Boston & Lowell Railroad on Nov. 26 was caused by striking the casting of a misplaced Tyler switch. It resulted in damage to rolling stock amounting to \$1,500. The engineer and fireman of the derailed train were

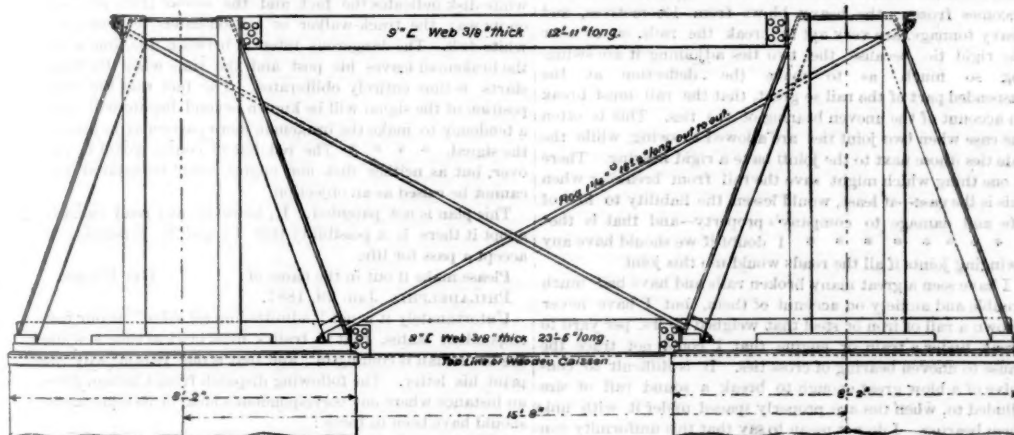


Fig. 3.

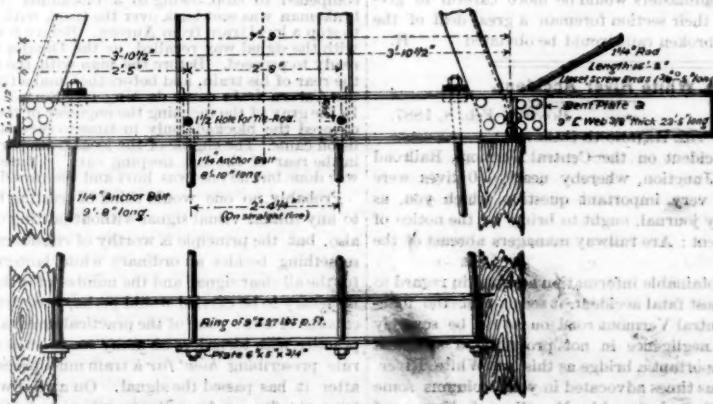


Fig. 4

CHICAGO, BURLINGTON & QUINCY BARREL PIER.

slightly injured, but were able to testify before the board. The switch, shortly before the arrival of the train, had been thrown for a train going from a siding upon the main track, and the switchman had forgotten to throw it back to the main track. The engineer acted with promptness as soon as he came in sight of the switch, and no blame attaches to him or to any of the train hands.

"The only matter deserving of remark is the inadequacy of this switch and of many of the old switches on our railroads when tried by the increased weight of the new style of locomotives. The object of safety switches is to prevent just such accidents as this. And when this switch was first laid under authority and command of law, it was a proper one for the business then done on the road. But an increase amounting, according to the testimony, of ten tons for each engine, with an increase of speed also, demands an increase of strength in the safety device which seeks to guard against derailments by such accidents as this.

"The Boston & Lowell Corporation has recognized the fact, and is supplying its whole main track with split switches. It was expected that the work would have been completed before this time, and notwithstanding various causes of delay it will probably be done before the ground is frozen. Other companies are doing the same. The attention of all railroad managers is called to the necessity of providing safeguards against the danger arising from the constant increase in the size and weight of locomotives.

"By the Board,

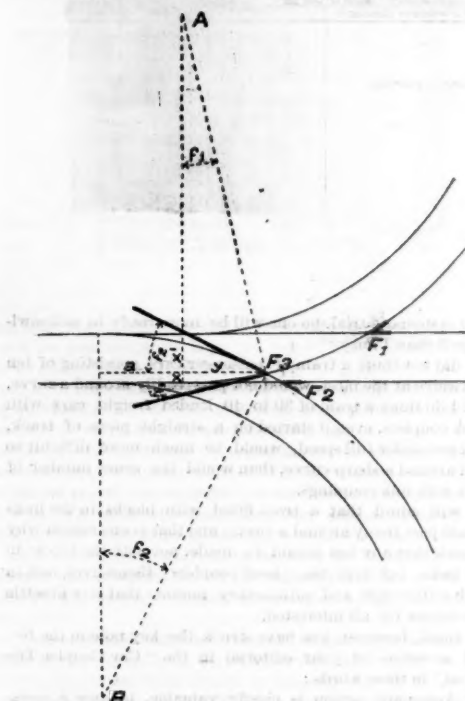
"THOMAS RUSSELL,
Chairman."

Location of Triple Split Switch.

NEW ORLEANS, Jan. 27, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

"Inquirer," whose letter appeared in your issue of Jan. 21, will find below the formulas for setting two split switches



with the point of one just behind the heel of the other so as to economize room and avoid a three-throw switch:
Let G = gauge of track.

R = radius of turnout curves.

a = distance between points of switches.

D = distance from tang. point turnout curves to point of No. 10 frog.

The assumption may be made that the turnout curves between the frog points and tangent points are parabolic, which, while not theoretically correct, is nearly enough so for all practical purposes.

Then using the notation of the figure

$$x = \frac{G}{D^2} y^2 \quad (1)$$

$$x^1 = \frac{G}{D^2} (y + a)^2 \quad (2)$$

adding 1 and 2 and remembering that $x + x^1 = G$, we have

$$x + x^1 = G = \frac{G}{D^2} y^2 + \frac{G}{D^2} (y + a)^2$$

$$y^2 + a y = \frac{D^2 - a^2}{2}$$

$$y = \frac{a}{2} \pm \sqrt{\frac{D^2 - a^2}{4}} \quad (3)$$

This value of y is the distance of point of centre or crotch frog from point of second switch rail, and in the case of the regular three-throw switch, where $a = 0$ reduces to

$$y = \frac{D}{\sqrt{2}} = \frac{5}{7} D$$

the well-known relation of the centre frog distance to the main frog distance.

The angle of the crotch frog f is equal to the sum of angle f_1 and f_2

but

$$f_1 = \sin^{-1} \frac{y}{R}$$

and

$$f_2 = \sin^{-1} \frac{y + a}{R}$$

hence $f = f_1 + f_2 = \sin^{-1} \frac{y}{R} + \sin^{-1} \frac{y + a}{R}$ (4)

In the case of the three-throw switch where $a = 0$, $f = 2 \sin^{-1} \frac{y}{R}$; or substituting the value of $y = \frac{5}{7} D$ and $R = 2$

$G N^2$, where N = the number of the main line frog, we have $f = 2 \sin^{-1} \frac{5}{7 N}$, another well-known relation.

J. KAUTSCHNITT,

Asst. Manager S. P. Co., Atl. System.

BALTIMORE, Jan. 29, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Jan. 21 "Inquirer" asks for a few formulas for finding frog distances, notwithstanding your tirade upon the subject in your issue of May 14, 1886. In regard to the

formula $D = S - G \times n - \left(\frac{S + G}{4n} \right)$, I would suggest that

it would be better to leave the signs as they are, for when G is greater than S , or even when they are equal, the result will be a minus quantity, indicating that it must be measured backward. My own calculation for this is as follows: $S \cos a = y$; $\frac{G}{\sin a} = z$; $y - z = D$; " a " being the angle of the frog; D , distance between the points of frogs in the direction of the road; S , distance between the gauge lines of rails, and G the gauge of track.

As for the other formulae that he asks for, I think he can find nothing better or more satisfactory than the drawing board, especially when you have intricate switches and contracted space. By plotting your work on a large scale, say 10 or 20 feet to the inch, you can locate any point of your switches, no matter how distorted your alignment may be whereas the formulae, as a rule, apply only to a straight line.

For a slip switch to work well the crossing should be entirely on a straight line, and the angle of the crossing not greater than 8° . O. K.

Causes of Broken Rails.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the *Gazette* of Dec. 31, "Roadmaster," under date of Dec. 8, has a communication in which he discusses at length Causes of Broken Rails.

I have given this matter a great deal of thought, and seeing the communication brought to mind some of my past experience with broken rails.

I agree with "Roadmaster" in all he has said, and take occasion to remark the road whose management allows flat wheels to run, in either cold or warm weather, is incurring a heavy expense for its stockholders, which might be avoided if properly looked after by those in charge of the car department. It is a fact that the "traveling sledge hammer" (or "pile-driver" would, I think, be a better name) is to be found on very many roads. It is a pity the stockholders do not always know the damage they do; but I must return to the discussion of broken rails.

There are some very important facts about broken rails, not mentioned by "Roadmaster." Uniform bearing of cross ties is the best preventive for breaking rails that I know of, and my experience runs back twenty-one years. By walking a distance of eight or ten miles in winter, over the best regulated road one can generally find some ties swinging from one to one-fourth of an inch, while other ties adjoining them are rigid and support the rails firmly; especially is this the case when the ballast is inferior. Frost sets in, the road-bed becomes frozen; the heavy blows from locomotives, and heavy tonnage, are very apt to break the rails, on or near the rigid tie, because the two ties adjoining it are swinging so much as to make the deflection at the suspended part of the rail so great, that the rail must break on account of the uneven bearing of the ties. This is often the case when two joint ties are allowed to swing, while the side ties (those next to the joint) have a rigid bearing. There is one thing which might save the rail from breaking when this is the case—at least, would lessen the liability to loss of life and damage to company's property—and that is the * * * * * I doubt if we should have any swinging joints if all the roads would use this joint.

I have seen a great many broken rails and have had much trouble and anxiety on account of them, but I have never known a rail of iron or steel that weighed 85 lbs. per yard to break under a train or engine that I could not trace the cause to uneven bearing of cross ties. It is difficult to conceive of a blow great enough to break a sound rail of size alluded to, when ties are properly spaced under it with uniform bearing. I do not mean to say that this uniformity can always be maintained, for wherever retrenchments are made the maintenance of way department is the first to suffer, but I do say that if roadmasters would be more careful in giving instructions to their section foreman a great deal of the trouble caused by broken rails would be obviated. H.

The White River Accident.

BOSTON, Feb. 8, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The late fatal accident on the Central Vermont Railroad near White River Junction, whereby nearly 50 lives were lost, brings up the very important question, which you, as the leading railway journal, ought to bring to the notice of railway management: Are railway managers abreast of the times?

From the best obtainable information at hand in regard to the cause of this most fatal accident, it seems that the management of the Central Vermont road ought to be severely censured for their negligence in not providing a sufficient guard rail at so important a bridge as this at White River. You have at various times advocated in your columns some devices similar to those designed by Mr. Chas. Latimer and Mr. R. J. McClure, and it seems to me that if this had

* Those who would like to know H.'s preference in the way of joint, can address him at this office.

been in use, it might have prevented this horrible catastrophe. And, again, why should not the railroads at all dangerous places or high embankments have guard rails? Would there not be fewer accidents of this kind? And again, if the trucks of this train had been equipped with proper check chains would the trucks not have been kept in a parallel line, and, with the assistance of a proper guard rail, averted this accident?

The writer, less than two weeks ago, passed over this White River Bridge. The train for some reason stopped on the bridge, and I passed to the platform and took a view of the situation. I then expressed to a fellow traveler that some day or other there would be another "Ashtabula," little dreaming how soon my prophecy would come true.

If the train was moving only at 8 miles an hour, and the break in the rail was 500 ft. from the bridge, was it not possible for the air-brakes to have brought the train to a stop before going on the bridge? Could not some device be connected with the automatic brakes to secure automatic action when a wheel leaves the rail?

The late accidents at Rio and Republic, and this at White River, are certainly shortening the life of the fatal car stove, and railway managers ought to profit at once, before national and state legislation compels them to adopt some more advanced system of heating cars, and do away with these frightful auxiliaries to all accidents. All experiments thus far with steam heating of cars prove it to be a success, notwithstanding the criticisms of some very practical railroad men. The experimental train on the Boston & Albany Railroad, which I had the pleasure of riding on a few days ago, seems to have solved this problem, so much so that the Railroad Commissioners of the state of Massachusetts have very strongly recommended this system in their annual report.

VIDEX.

Calling in the Flagman.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Permit me to make you a consignment of wisdom.

The subject of my discourse is "Calling in the Brakeman." On all sides it is an admitted fact that the most critical time to a train on the road is the interval which elapses between the calling in of the brakeman and the starting of the train. To suggest a possible remedy is the object of this effusion.

In the rear car of each train I would place two iron disks, one red and the other white, say about nine inches diameter. Each disk to have an iron rod attached for the purpose of sticking it in the ballast. Whenever a train stopped on the road away from a station I would have the brakeman carry the red disk back a sufficient distance and stick it in the ballast between the rails, where it would be impossible to pass it unseen by at least one of the men on the engine.

After performing this duty I would have the brakeman return to the train and render such assistance as might be needed. When the train was ready to proceed I would have a white disk of similar design placed beside the track at the rear car. At night lanterns, of course, would be used. The result would then be as follows: A train following would see the red disk and at once slacken, pick up the disk and proceed slowly until the first train is reached.

Should the first train have proceeded in the meantime, the white disk indicates the fact, and the second train proceeds on its way, the track-walker or section-hands returning the white disk. The dangerous interval between the time when the brakeman leaves his post and the time when the train starts is thus entirely obliterated. The fact that the exact position of the signal will be known beyond dispute will have a tendency to make the brakeman more particular in placing the signal. * * * * * The red disk of course would be run over, but as neither disk nor engine would be injured, this cannot be raised as an objection.

This plan is not patented. If, however, any road cares to adopt it there is a possibility that I could be persuaded to accept a pass for life.

Please make it out in the name of

HIS KNOBS.

PHILADELPHIA, Jan. 29, 1887.

Unfortunately it is not "admitted on all sides," as our correspondent states, that a train's most critical time is while the brakeman is coming in; and that is one reason why we print his letter. The following dispatch from Chicago gives an instance where our correspondent's idea, or its equivalent, should have been in force:

"The through Omaha passenger train on the Chicago, Burlington & Quincy Road passed Aurora at 3 o'clock Monday morning, Jan. 31. Thirty miles from this city it was compelled to stop, owing to a blocked freight train. A brakeman was sent back over the track with a danger signal to stop a local train from Aurora. Before it arrived the man with the signal was recalled, as the Omaha train was again ready to proceed. Before the man with the lantern reached the rear of his train, and before the Omaha train had started, the Aurora train came dashing into the rear of the sleeper. In the gray of the morning the engineer of the local train discovered the blockade only in time to reverse before the collision came. The engine of the local train partly buried itself in the rear of the last sleeping car. Considerable damage was done but no one was hurt and the cars did not take fire.

Probably no one would think of trusting to these disks or to any similar visual signal without putting down a torpedo also, but the principle is worthy of consideration. At night something besides an ordinary white lantern should be used for the all clear signal, and the number of disks, lanterns, etc., necessary to be carried would perhaps require an additional caboose or two. One of the practical annoyances in the usual practice with torpedoes on many roads is the absence of any rule prescribing how far a train must proceed with caution after it has passed the signal. On a road with few or short tangents five or ten miles may have to be traversed even in clear weather, before the whereabouts of the train that placed the signal can be known with exactitude. —[EDITOR RAILROAD GAZETTE.]

The Alignment of Operated Roads.

TO THE EDITOR OF THE RAILROAD GAZETTE:

On most of our operated roads the alignment upon which construction was based has become entirely a thing of the past, its loss frequently causing much embarrassment in emergencies demanding quick action, and entailing uncertainty and expense in all future land disputes that may arise. The problem of leaving a constructed road with tabulated alignments and gradients as definite as (and more correct than) the original location tables has seldom been squarely met by construction engineers. It has generally been postponed until a more convenient season, a season not likely to come during the life of a construction department. Still more seldom has the other problem been met of distinctly establishing the relation, at all important points, between such final line and the original line from which land lines and right of way were located.

The difficulty of determining the original line, after construction is finished, is caused first by assuming that the original line is a correct line; and secondly, by assuming that successive revisions of the original line can be traced from it up to the final line. It is almost essential that both of these ideas be got rid of before a satisfactory plan of work can be decided on.

Each retracing of the line shifts any station numbering to a different locality, and errors of chaining and observation, or defective chaining in the original line, are constantly being discovered. Hence the original line should be carefully referenced at once, not merely at termini of curves, but at many intermediate points, especially near land lines and important objects. The references should moreover be so durable that they will last at least until track is laid. Especially should original tangents be extended. This series of original stations and directions can thus be used as a base from which to show directly each proposed revision and subsequent changes of revision. To attempt to maintain the "history" of successive changes made during construction, without carefully preserving the original line, implies a degree of perfection of surveys much beyond what any road would care to pay for. In the management of surveys (as of men) he is most successful who takes things as they are and will be, not as they should be, and who provides accordingly.

The original stations at all land lines should, if possible, be carefully referenced, and the angles of such lines with centre line read with vernier as well as with the needle.

Again this original alignment should be viewed as an important land survey having a most important bearing on all the lands of the company; and as such, should be carefully and permanently monumented with as much care as the boundaries of any valuable tract of land, and entirely irrespective of its uses for construction purposes. If a separate assistant were put in charge of this work alone, of monumenting the line from which the right of way is secured, the saving would on many roads be great, owing to the diminished number of legal disputes thereafter. The local assistants in charge of construction are apt to be under too great pressure and to be working in too feverish a haste to give such monumenting the proper amount of care and attention.

Although the final line, as related to the original line, cannot be decided by a "history" of changes, every course, both of the centre lines and of outside surveys, should have a "calculated" course given it, deduced from a tangent of the original line. Thus each tangent of the original line serves horizontally the same purpose as a bench does vertically in leveling, and the general direction of every line used on the work is known independently of the local processes by which it was arrived at. Owing to possible errors of the original, however, the P. C. and P. T. of the original tangent from which such survey or change was started should always be given. By this method the daily office record book does not become unintelligible and out of date, but has permanent value. Frequent going over of the same ground, to connect objects with later lines, is avoided.

Having thus preserved the original line and data as clearly as practicable, the question arising is, at what stage of construction can a final perfected alignment most readily be run? It should certainly be before the local assistant engineers have been dispensed with, and all the useful information they possess should be carefully connected with the final line and recorded. The retention of such engineers specifically for this work, even if their services be not required otherwise, would save the future operating department endless vexations, and be well worth the expense involved.

The running of such a final line should be after the general completion of the roadbed to subgrade, to insure more accurate measurements by having graded surfaces for measuring over. The two opportunities in which the assistant can bring up such final alignment while performing his regular construction work are when setting final trimming stakes or when giving track centres. Since the final alignment and the track lines should coincide, this final alignment should be arranged before tracklaying. (To arrange a final line well enough merely to meet the tracklayer's ideas and wishes often seems sufficient to the local assistant, although most engineers of moderate experience can testify that construction tracklayers are by no means over critical on this point.) The careful connection with original location and with land lines, and the locating of structures, can be done after tracklaying; but the referencing of the final line determined upon, and the extension of the tangents cannot be thus postponed, as ballast and track will play havoc with the final centres on the grading. In arranging the final line, a large number of irregular stations is less hurtful than the difficulties caused by postponing the final arrangement until one line can be run throughout; and an office rearrangement

Statement compiled from Reports of Comparative Tests of Car Axles with Rigid Wheels and with Independent Wheels, showing the saving in Traction by the use of Independent Wheels, on Steam, Roads and City Passenger Roads.

AUTHORITIES.	Date.	Axles.	Radii of curve in feet or degree.	Resistance.		In favor of loose.	
				Fast. Pounds.	Loose. Pounds.	Pounds.	Per cent.
Reuben Wells, Report R. R. Master Mechanics' Association, 1873.	1873	Models.	300	796.47	661.07	135.40	17.
Henry Waterman, R. R. expert, Vermont Central R. R.	1874	Mittimore.	3"	p.t. 17.21	13.15	4.06	23.6
Henry Waterman, R. R. expert, Vermont Central R. R.	1874	"	4"	p.t. 26.55	13.67	12.88	48.5
Henry Waterman, R. R. expert, Centennial Exhibition, narrow gauge.	1876	"	279' to 450'	12.47	7.48	4.99	40.
P. H. Dudley, C. E., Boston & Albany R. R.	1877	"	313 to 596				32.24
P. H. Dudley, C. E., Boston & Albany R. R.	1877	"	313 to 596				29.74
Octave Chanute, C. E., Metropolitan El. R. R., in Railroad Gazette.	1878	Baker.	90	1,700	1,300	400	30.76
Octave Chanute, C. E., Metropolitan El. R. R., in Railroad Gazette.	1878	"	Tangent.	600	450	150	33.33
Charles E. Emery, C. E., Houston, West Street and Pavia Ferry.	1878	Harrison.	40	53.57	34.03	19.54	36.48
Charles E. Emery, C. E., wear of track and wheels, Houston, West Street and Pavia Ferry.	1878	"	40	41.77	22.23	19.54	46.78
H. Stanley Goodwin, Supt. Lehigh Valley R. R.	1883	Orne.	764 to 1,307				17.5
H. Stanley Goodwin, Supt. Lehigh Valley R. R.	1883	"	764 to 1,307				33.
B. Grimshaw, C. E., Metropolitan El. R. R., Am. Jour. R. W. Appl.	1884	Dixon.	90	2,100	1,825	275	15.

See also in Railroad Gazette June 11, 1880, "The Bavarian Experiments on Train Resistances," by Baron M. M. Von Weber.

of the stationing will readily eliminate them. Such a final line would leave our operated roads with their mile-posts within much less than a mile or two of their proper locations, instead of the reverse, as is now too frequently the case.

After the complete rendering of such final line and the office adjustment to a uniform stationing, the mapping and the entering of the various right-of-way tracks are easily done, and can be shown in the final filing of constructed line required by law in most states.

Such a final alignment would doubtless have practical value in the estimation of many managers and superintendents who now consider construction alignments merely theoretical and worthless. It would assist toward better maintenance of roadway, and permit some advance toward definite spiral approaches to curves, and better maintenance of vertical curves. What is still more important, the road and objects along it would be so reliably depicted that these managers would save valuable time in emergencies by consulting the maps instead of being obliged to await a local survey before making a decision in the case in hand.

Whether this final alignment be run before tracklaying or be the result of surveys on an old road to establish such line, one consideration is of the greatest importance, namely, that each tangent have its own points of reference and extension—in other words, that no tangent should be dependent on the running of an adjacent curve for its establishment from time to time as the maintenance gangs may require. It rarely occurs that such a tangent is twice established by such running to within a fraction of an inch laterally of the same line, if the curve be of any length; and the relining of a whole tangent by even a fraction of an inch is sufficient to make the most even-tempered section man repudiate surveys as humbugs. Few engineer parties on maintenance have time and tools that will permit nicety of running sufficient to avoid this trouble.

In establishing definite lines for roads already operated without them, experience will frequently lessen the expense by half, and what would seem an overestimate to one engineer would seem the reverse to another. The writer's experience in such re-establishment on three different roads shows a variation under similar conditions of over 50 per cent., according to the method allowed or made necessary for special reasons. In many cases it is a mistake to attempt continuous field work with a special and large party on such re-establishment. Too many perplexing questions arise on curves, which the chief of party alone can decide, the subordinates meantime having little preliminary work and no estimates to occupy their time, as on location for construction. It is difficult also in the field to locate and decide proper radii without the aid of delicate office work requiring appliances better than a moving party can have. Curvatures decided wholly in the field are often a grotesque series of compounds, having a half-dozen to a dozen radii. Special questions of land lines often complicate the problem still more, and render desirable a consultation of maps and records preserved at the main office.

The utmost a continuous field party can generally do is to fix the tangent lines, reference and extend them, and put a quick and not too permanent preliminary around each curve, noting distances to gauge lines. The final changing and fixing of curvatures should be done successively by the local parties on maintenance, devoting a few days each month to the work and without greatly increased expense. The connections with land lines and locating of objects being done by such parties, the road gains more or less permanently by the knowledge thus retained on its line.

ARCH'D A. SCHENCK.

Independent vs. Fixed Wheels on Car Axles.

PHILADELPHIA, Jan. 27, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The letter of T. N. Ely, Superintendent, referred to in my former note, is dated June 18, 1883.

I inclose copy of a table of tests which I have gathered from various sources showing the saving by independent wheels on

*The results of these experiments in detail were as follows:

No.	Curve radius, ft.	Descending grade, 1 ft. in	Speed, per hour, miles	Load, pounds,	Power.		Difference in favor of loose.	
					Loose, pounds.	Tight, pounds.	Lbs.	Per cent.
1.	2,300	52.38	8.64	19,000	362.8	415.6	52.8	14.4
2.	8,300	42.35	8.21	39,000	661.07	796.47	135.4	17.
3.	24,250	19.33	17.3	19,000				11.4
4.	28,290	45.60	7.85	18,000	394.7	441.1	46.4	11.4
5.	32,330	43.54	7.83	38,000				8.4
6.	36,370	40.	11.74	18,000				0.4
7.	40,410	40.	11.74	38,000				3.4
8.	44,450	36.20	13.70	38,000				2.4
9.	48,490	25.85	22.68	18,000				None.

curves. As most of these tests were made with one car only, they do not show much better than that of Mr. Wells with his "perfect model." The only proper way to test this question is to fit up two trains of say 50 cars each alike in all respects, except that one shall have all rigid wheels, and the other all independent wheels. Run them in the same trade for 6 or 12 months, and keep an accurate account of the mileage, weight of loads, coal, oil, water, repairs and wear and tear of wheels, journals and brasses.

At the end of the run make careful comparison of the results, and if the independent wheels do not show a decided saving, then that will end the matter.

The next question is, Who will make the experiment?

Respectfully yours, JOS. S. FAXSON.

Accident Statistics.

CHICAGO, Ill., Feb. 3, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It is probable that your record of train accidents, from year to year, has some relation to the total number which occur in the respective years, although there is no means of determining whether the record has any value of that kind or not. Statistics are certainly dangerous, if relied upon, unless they are correct.

In order that you may form some idea of the proportion existing between your statistics and the number of accidents which actually take place, sufficiently important to be noted upon a well regulated railroad, I subjoin a copy of the record for a railway about 500 miles in length, of which I have the statistics for last year. You will see that the total number of recorded accidents on that well conducted line amounted to 692. Your record covers all the lines in the United States amounting to, say, 130,000 miles. I am of opinion that the 500 miles of road to which I refer, is managed about as well as the average of railroads, and better than some of the more important ones. If we calculate the sum of accidents which probably happened according to the standard of this road, we shall have.

500 : 692 :: 130,000 : 179,920

giving a total of 179,920 accidents in the United States, of which you report 1,211, leaving a balance not reported of 178,709. The experience of the little road to which I refer was as follows:

Kind.	No.	Damage.
Head collisions	9	\$6,000
Trains breaking	24	8,000
Other collisions	102	15,000
Broken machinery	173	8,500
Defective track	48	1,200
Misplaced switches	26	500
Other causes	312	20,000
	692	\$57,000

Subdivided as follows:

Damage to locomotives	\$19,000
" " cars	33,000
Cost of wrecking	3,000
	\$57,000

The loss in damage to freight is not taken into this account nor fractions less than one hundred dollars in these totals.

PITTSBURGH & WESTERN RAILROAD COMPANY.

MAINTENANCE OF WAY.—FOR REPAIRS.

Weekly report of materials used on Sub-Division No. for week ending 188

	Sunday.		Monday.		Tuesday.		Wednesday.		Thursday.		Friday.		Saturday.	
MATERIALS TO BE USED	No.	Between which mile posts.	No.	Between which mile posts.	No.	Between which mile posts.	No.	Between which mile posts.	No.	Between which mile posts.	No.	Between which mile posts.	No.	Between which mile posts.
Cross-ties—lineal feet.														
Rails—lineal feet.														
Splice bars—pairs.														
Bolts and nuts.														
Railroad spikes—lbs.														
Crossing plank—lineal ft.														
Cut spikes—lbs.														
Nails—lbs.														
No. 6 frogs.														
No. 8 "														
Switch stands—cast.														
" rods.														
" targets.														
" chairs—single.														
" double.														
" bridges.														
" locks.														
" ties.														
Switches—ground lever.														
Oil—carbon, quarts.														
" lard.														
Powder—kegs.														
Fuse—lineal feet.														
Ballast stone—cubic yards.														
" lineal feet.														

I certify that the above report is correct.

Foreman.

You give an account of 3 accidents only from the failure of couplings or draw-bars, for the whole United States; that is, only one-eighth of the number, resulting in damage, which occurred on this little road.

It would doubtless contribute much to a better knowledge of the defects in our system of railroading, if we could have accurate statistics of the accidents which occur. For obvious reasons, the managers of any railway would be quite unwilling to make a public showing of the number of disasters which happen upon their lines, in such a manner that it would be known upon what road they take place; but I should think that any railroad official who appreciated the value of arriving at something approaching the facts, might give you anonymously the record of his own road, upon the assurance that the name of the road would not be revealed. Indeed, it would answer every purpose if the number of each class of accidents per 100 miles were to be given, without specifying even the length of the road; although it would be an advantage to know the approximate traffic of the road in freight and passenger trains. It happens that the traffic of the road, of which I have given an account, is almost an exact average between the lighter and heavier worked lines; and so I think it is as favorable a standard from which to calculate for the whole extent of the system of the United States, as any other line of equal length. Yours truly,

ARCHIMEDES STEVENSON WATT, C. E.

Maintenance of Way Report.

POTTSVILLE, Pa., Jan. 31, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to the "Multum in Parvo" time book mentioned by Virginus on page 41 ante, of the *Railroad Gazette*, I should be pleased to submit to those interested a sample sheet of the kind of time report used on the Pittsburgh & Western R. R. during my connection with the same some years ago.

These reports, as soon as received, were entered into a book similarly ruled as the sheets with this difference, that they contained sufficient columns for a whole month, in this respect agreeing very closely with Virginus' form of book.

A close inspection of my sheet will render any extended description superfluous.

Respectfully, EMILE LOW.

Maintenance of Way Report.

The above table is printed on one half of a folder, of which the other half is given below, the endorsement being on one fold and the instructions on another.

Instructions.

In order to insure a correct accountability of the nature of work done and material used on each Sub-Division, and that Foremen may act understandingly in preparing correctly the returns of the same, the following instructions are given in relation to the use of this form:

Distribution of Work Done.—Enter daily the total amount of time engaged upon each kind of work done during the day, which is obtained by adding together the total number of hours worked by all the men employed that day. For instance: If on the first day of the month four men are employed, three of whom work ten hours each, and the remaining one five hours, the total number of hours work is thirty-five; and this number of hours should be accounted for on that day, charging to each kind of work the number of hours work done upon it. If all were engaged upon "Surfacing Track," place in the column for that day, and opposite this printed heading thirty-five hours; or if twenty hours should have been engaged upon "Cleaning Ditches," ten upon "Ballasting Track," and five upon "Cutting Weeds and

Grass," place opposite those printed headings these numbers of hours.

In this manner the time will be accounted for daily, and in order that the same will agree with the number of hours worked, as reported on the time book each day, the total time made by the men must be first ascertained, entered upon the time book, and then is the distribution to be made, which must include the time of the Foreman, and which must agree each day with the number of hours reported on the time book.

Distribution of Material Used.—Enter daily the quantity of material used in the *Repairs* of the main track and sidings, as provided for by the printed headings. In reporting switch stands and frogs, state the number of each kind of switch stands and each kind of frogs.

Materials used on the building of new or extending of old sidings, must not be included in this statement, but separately reported on form M. W. 611, which is specially provided for that purpose.

The time sheet must be free from erasures and blots.

Foremen will take special pains to get the correct names of the laborers and have the same legibly and correctly written.

Full and explicit directions for making these reports correctly are now given, and all returns unintelligible and obscure as to the distribution of work, labor and material will be returned and no action taken on the same until returned in a satisfactory shape.

EMILE LOW,
Chief Engineer.

PITTSBURGH & WESTERN R. R. CO.

ENGINEERING DEPARTMENT.

MAINTENANCE OF WAY.

Sub-Division No.

SUB-DIVISION FOREMAN'S

WEEKLY REPORT

FOR WEEK ENDING

Saturday 188

I certify that the within named men have been diligently employed during the time specified, in the service of the Pittsburgh & Western R. R. Co.

Foreman.

EXAMINED AND FOUND CORRECT:

Master of Road.

NOTE.—Foremen in making out weekly reports for last week of any month, will return time only up to the last day of the month, inclusive; and make out separate reports for remainder of week.

(This space is $1\frac{1}{2}$ in. in the original);

This report must be sent to the Master of Road by the first passenger train running in the right direction every Monday morning, and promptly at the close of the month.

The following table is a condensation of a form which covers the back of all the above:

PITTSBURGH & WESTERN RAILROAD COMPANY.

Engineering Department.

MAINTENANCE OF WAY.—REPAIR MEN.

WEEKLY REPORT of time made and labor performed on Sub-Division No. for the week ending Saturday 188

No.	NAMES.	Occupation.	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Total hours made.
1		Foreman								
2		Laborer								
3										
4										
5										
6										
7										
8										
Total hours made each day...										

DESCRIPTION OF LABOR PERFORMED.	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Total hours worked.
Ballasting track								
Repairing bridges and trestles								
Surfacing track								
Renewing and repairing frogs								
Renewing and repairing switches								
Repairing road crossings								
Replacing defective rails								
Replacing defective cross-ties								
Cleaning ditches								
Removing slopes								
Sloping cuts								
Widening embankments								
Watching tunnels								
Removing snow and ice								
Cutting weeds and grass								
Total hours worked each day								

Steam Inspection Car.

The accompanying engraving represents a steam inspection car manufactured by the Kalamazoo Railroad Velocipede Co. (of Kalamazoo, Mich.)

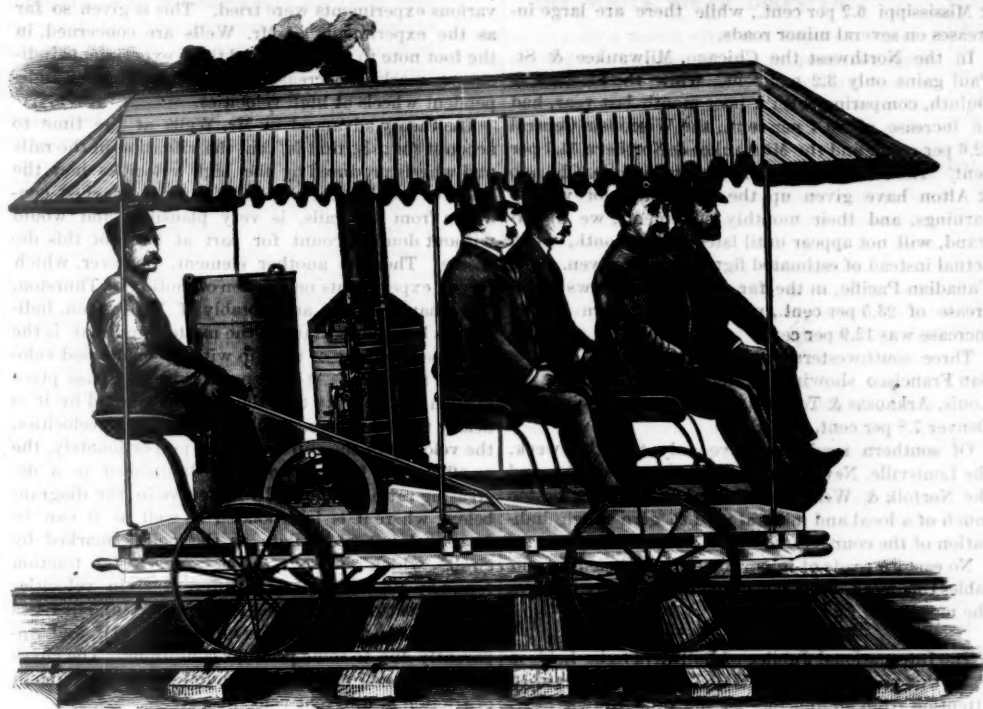
The weight of the car complete is 1,000 pounds, and it is claimed that it can be lifted from the track by two persons at any station or railroad crossing. The car will carry seven persons and can be run at 20 to 25 miles per hour. It is especially designed for the use of division superintendents, track masters, road and bridge carpenters, etc.

The oil and water tank (combined) is of galvanized iron, and holds 30 gallons of water and 10 gallons of oil. The illustration shows patent tension suspension wheel, constructed of steel throughout, 24 in. dia.

The engine and boiler are designed with a view to simplicity and a minimum number of parts. The boiler is strong, and is arranged so as to give a good circulation of water.

The fuel is ordinary kerosene, which burns without smoke or smell, and without danger of fire or explosion. It is entirely controlled by one valve. The amount used is about one-half gallon per horse-power per hour.

The engine has very few parts; is economical in the use of steam; the working parts are inclosed, and lubrication is automatic. It is perfectly balanced, and consequently runs



STEAM INSPECTION CAR

Made by the KALAMAZOO RAILROAD VELOCIPED CO., Kalamazoo, Mich.

at high speed without noise or vibration. The boiler has a double jacket, with filling of mineral wool between the sheets to prevent radiation of heat. The outside shell is Russia iron, ornamented with brass bands.

The boiler is supplied with water by a brass plunger pump, connected to the shaft of the engine. The boiler is fitted with water glass, steam gauge, safety valve, steam whistle, blow-off cocks, etc. The engine has an automatic sight feed and lubricator, and all fittings of boiler and engine are of polished brass.

The engine is connected to the driving wheel by means of leather belting.

The Interstate Commerce Bill Reviewed.

The Interstate Commerce Bill has given rise to a very considerable amount of literature. One of the most noteworthy contributions to this has been written by Henry V. Poor, and published by Poor & Greenough, of 45 Wall street. It has nothing to say about the pooling clause, but attacks vigorously the long and short haul section. Mr. Poor points out how a strict application of this principle would interfere with the movement of wheat from the Mississippi valley; how the large tonnage carried by our railroads has been made possible by the reduction of long distance rates; and how, conversely, the great reduction in rates has been made possible only by the increased tonnage which the long distance movement could give; and, finally, how this system has really created the commerce of our country, both foreign and domestic. He makes two tables of ton mileage and rates—on for the trunk lines; the Pennsylvania; the Pittsburgh, Fort Wayne & Chicago; the New York Central; the Lake Shore; the Michigan Central; the Boston & Albany; and the New York, Lake Erie & Western Railroad; the other for the roads centering in Chicago—the Illinois Central; the Chicago and Alton; the Chicago & Rock Island; the Chicago, Burlington & Quincy; the Chicago & Northwestern; the Chicago, Milwaukee & St. Paul Railroads.

YEAR	Trunk lines.		Chicago roads.	
	Ton-miles.	Rate.	Ton-miles.	Rate.
1865	1,054,324,000	2.900	517,421,450	3.642
1866	2,044,412,000	2.546	576,888,638	3.439
1867	2,258,210,000	2.905	768,171,050	3.175
1868	2,651,675,000	1.951	893,856,984	3.154
1869	3,159,559,000	1.715	1,054,559,835	3.076
1870	3,744,110,000	1.585	1,234,678,91	2.423
1871	4,341,127,000	1.478	1,231,038,058	2.509
1872	5,181,259,000	1.475	1,337,078,065	2.582
1873	5,782,058,000	1.470	1,704,969,090	2.188
1874	5,879,058,000	1.342	1,851,643,824	2.160
1875	5,937,240,000	1.161	1,904,937,377	1.979
1876	6,739,524,000	.983	1,994,712,255	1.877
1877	6,536,991,000	.971	2,211,021,475	1.664
1878	8,833,397,000	.807	2,822,885,866	1.476
1879	10,120,770,000	.725	3,470,822,877	1.280
1880	10,544,831,000	.840	4,544,668,053	1.209
1881	11,639,938,000	.779	4,435,202,005	1.240
1882	11,169,160,000	.665	5,011,311,034	1.384
1883	11,141,726,000	.842	5,768,173,439	1.308
1884	10,719,518,000	.740	5,910,110,011	1.251
1885	11,331,906,000	.636	6,287,346,541	1.200

These results are conveniently arranged for reference, and wonderfully striking. No other country can show anything like it.

We already made one or two allusions to Mr. Blanchard's Review of the Interstate Commerce Bill, which is now published in pamphlet form. He makes no attempt to discuss the general effect of the bill on business, but contents himself with showing its unfairness. His arguments against a strict construction of the long and short haul clause is an overwhelming one, showing how any such construction would put

the shorter and less perfectly consolidated lines at a great disadvantage when compared with their rivals. His defence of pools is vigorous and characteristic, and takes the ground (uniformly held in these columns) that, if properly arranged and regulated, they are not merely a means, but altogether the most effective means, of guarding the public interests as distinct from those of the railroads themselves.

This subject was discussed in the proceedings of a convention of state railroad commissioners held at Des Moines in December. The objects of the convention were of a most general character, including all matters of railroad traffic that might be brought to its attention; but, practically, the bill before Congress became the main subject of discussion. Commissioner J. W. Midgley and Mr. E. P. Ripley, of the C. & Q., discussed the question of pools and of reasonable rates at some length. The debate which followed was a most interesting one. The committee to whom the subject had been referred had reported the following resolution:

Resolved, That this convention of railroad commissioners of the states of Iowa, Kansas, Missouri, Nebraska, Colorado and Minnesota, and of the territory of Dakota, while regretting the differences which have occurred between the true friends of Interstate regulation, leading to the failure of the Cullom bill, yet rejoice to learn that the Conference Committee of the Senate and House of Representatives of the Congress of the United States have agreed upon a measure retaining the essential features of the Cullom bill. That it is the sense of this convention that the State Railway Commissioners will not attain to the full measure of their usefulness till they are supplemented by a national commission, and that we regard any regulation of rates based upon a pro rata scale of mileage as detrimental to the interests of our respective states and territories.

Commissioner Coffin, supported by Commissioner Humphrey, offered this additional resolution:

Resolved, That it is highly desirable that some reasonable plan for reaching the abuses in the transaction of Interstate commerce shall be adopted by congress. It is also plain that any such measure must be largely experimental in character, and we deem it highly important that the legislation be framed as to admit of prompt modification or suspension if any results demonstrate that the consequences of executing any of the proposed provisions will result in general disaster to the railroads, or that any considerable portion of the business interests of the country. These considerations will, in our opinion, apply with especial force to those parts of the pending Cullom and Reagan bills forbidding pooling, and undertaking to regulate the long and short haul by exact rules, because in practical operation these and other causes of the proposed law may result in great injury to the people of the western states whose interests lie in securing cheap and staple rates for agricultural products.

This brought out some sharp opposition, and was finally withdrawn, while the original resolution of the committee was accepted. The whole proceedings have been published in pamphlet form, and contain matter of permanent interest.

Freight Train Brakes.

A meeting of the Committee of the Master Car-Builders' Association on freight train brakes was held at the Hotel Anderson, Pittsburgh, on the 9th inst. The meeting, as previously announced, was held to determine the rules and conditions governing the brake tests to be held at Burlington, Ia., prior to the Master Car-Builders' convention in June next. A joint meeting was then held of the members of the committee present and the representatives of the various brake companies. The rules proposed by the committee were submitted seriatim to the meeting and were fully discussed and finally agreed upon. The following members of the committee of the Master Car-Builders' Association were present: G. W. Rhodes, Chairman, J. S. Lentz and D. H. Neale. The following representatives of the different brake companies that propose taking part in the tests were present: American Brake Co., Geo. H. Poor; Carpenter Air Brake and Carpenter Electric Brake, Thomas Prosser, Jr.; Eames Vacuum Brake Co., Jas. H. Slade and N. W. Howson; Hanson Automatic Air Brake, W. W. Hanson; Park Electric Brake, H. S. Park and W. Sherman; Rote Brake Co., C. F.

Harding; Waldemar Electric Brake Co., L. W. Goss; Westinghouse Brake Co., T. W. Welsh, S. H. Sprague, Levi W. Close and F. Moore; Widdifield & Sutton Brake Co., W. D. Widdifield.

The following is a list of the tests to be made at the trials:

GENERAL TESTS.

1. Fifty empty car trains making 4 emergency stops; first, 20 miles per hour on a level; second, 40 miles per hour on a level; third, 20 miles per hour on 53-foot grade; fourth, 40 miles per hour on same grade.
2. Fifty mixed car trains, two-thirds of the cars loaded, one-third empty, 75 per cent. of the latter being in front half train; first, second and third stops as above, fourth stop on grade at 30 miles per hour.
3. Fifty mixed car train with hand brakes and engine and tender automatic brakes; four emergency stops; first on a level at 20 miles per hour; second, at 30 miles per hour on level; third, at 20 miles per hour on 53-foot grade; and fourth at 30 miles per hour on same grade.
4. Train of 50 mixed cars to be let down a 53-foot grade 3 miles long; speed 20 miles per hour at top of grade to be reduced to 15 miles per hour as soon as practicable and maintained without material variation to the foot of the grade.
5. One or more runs over the course to be made with trains having brake shoes $\frac{1}{2}$ to $\frac{3}{4}$ in. off the wheels before the brakes are applied.
6. Fifty mixed car trains; tests on the level; trains to be broken into two or more unequal parts, speed 30 and 20 miles per hour; after the train is broken any assistance will be rendered only by a brakeman, who shall be riding at the rear of the train or on the engine when the breakaway occurs.
7. Train resistance test; fifty car mixed trains, first to pass No. 1 stop post at 20 miles per hour, letting the train drift to a stop, no brakes being applied; second, to pass No. 3 post at 5 miles per hour, letting train drift until No. 4 post is passed at which point the accelerated speed shall be recorded and the train stopped.

The following are the rules governing the tests:

RULES GOVERNING BRAKE TESTS TO BE HELD ON THE CHICAGO, BURLINGTON & QUINCY R. R., AT BURLINGTON, IOWA, COMMENCING MAY 9, 1887.

1. Each brake company will provide its own engine; such as do not wish to furnish a special crew will be furnished from working crews of Chicago, Burlington & Quincy R. R. Ordinary eight wheel, four wheels coupled engines must be employed; each engine must have 17x24 cylinders and not less than 51,000 lbs. on the drivers; both tender trucks must be provided with brakes and cast-iron shoes; plain wrought-iron shoes to be used on the drivers. Each brake company to have the option of using its own or such other engine brake as it can procure.

2. Each brake company will furnish, fitted with its brake, 50 box cars of 40,000 lbs. capacity or over, and 34 ft. long being preferred. Each car to be equipped with brakes on both trucks and plain cast-iron shoes. The cars to be delivered to the committee, free of charge, at some point on the Chicago, Burlington & Quincy Railroad on or before May 2. After the trial the cars will be returned to the owners at the points of delivery.

3. The Chicago, Burlington & Quincy Railroad will not be held responsible for mileage of cars while on its lines or for any damage to the cars that may occur through the inefficiency of the brakes.

4. Close couplings are recommended, and companies using link and pin couplers must be provided with wedges to take up slack. Half the stops will be made with close couplings and half with slack, should any of the brake companies so elect.

5. In operating brakes they must be applied and released by the engine man only, except as specially provided for in test No. 6 special tests.

6. Three runs over the course will be made with tests one, two and four. Two runs will be made with test number six, and one run with tests numbers three, five and seven.

7. Sand must not be used on any of the stops except with the special permission of the committee.

8. The leverage of the brakes will be recorded by the committee, and none of the apparatus must be changed at any time during the trials, except as previously provided.

9. With continuous brakes the pressures carried on the engine prior to the application of the brakes will be recorded for each test.

10. All tests to be made under like conditions of rail, grade, etc., as near as possible.

11. A dynamometer car will be placed in the front end of each train with complete recording mechanism. In the middle box-car of each train a portable apparatus will be placed for recording diagrams, showing, first, a strain line in pounds exerted on the brake lever during the stops, and second, a speed line in miles per hour during each stop. An electrical signal will be arranged for communication between the front and rear ends of the train.

12. Competitors will be subjected to all the general tests; special tests will be optional.

13. The parts pertaining to each brake, other than the foundation brake, hose and diaphragms, will be painted a red lead color.

14. Each brake company will use its appliances in the manner it shall consider best, provided that in the opinion of the committee such methods are safe and practicable in ordinary working.

15. The Committee reserves the privilege of adding such tests as in its judgment may be deemed desirable.

16. Three or more competitors will be required before the tests will be entered into. Any competitor desiring to enter the tests should communicate with the chairman on or before April 1.

17. The committee are not in a position to furnish equipment for these tests, but regards the subject of great interest to railroads and trust they will contribute to its success by furnishing engines and cars to the competing brake companies and affording them any other reasonable facilities.

Recent Patents.

Mr. John T. Wilson, of the Pittsburgh Forge & Iron Co., has taken out a patent for improved methods of forging wrought-iron Pennsylvania pattern drawheads from blank bars forged with thick ends. He has also patented methods of making closed mouth wrought-iron drawheads.

Mr. John R. Whitney, of Philadelphia, has patented a chill for car wheels. The chilling surface is separated into segments, and air passages in the body of the chill prevent it from expanding with the heat, and so keep the chill longer in contact with the wheel.

Mr. Nathan Washburn, of Allston, Mass., patents a singular form of steel-tired car wheels and a car wheel in which the body, including tread and flange, is composed of manganese steel, and the hub of cast iron. The two are united by a perforated plate interposed in the process of casting. The manganese steel is to be toughened or hardened by being plunged into water while still hot.

Mr. George Westinghouse advances 64 claims in a patent for a very elaborate arrangement of interlocking mechanism for switches and signals.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Our correspondent of illustrious signature on the subject of accident statistics emphasizes what we have often admitted with regret; that is, the imperfection of our returns. They are, probably, nearly as full returns as are obtainable in this country without compulsory reports, such as are made in England, or without a common agreement of companies controlling a considerable proportion of the mileage. We should be only too happy to give up our detailed statement of accidents if we could see our way to giving a fairly accurate and entirely impersonal statement of the accidents which do occur. The intent, of publishing this news, is not to pillory any one, but to throw light on the prevention of accidents by a systematic resumé of their frequency, their nature, and the time and circumstances of their occurrence.

As a matter of news we have felt obliged to give the name of the road on which the accidents occur, but this we should be willing to omit, if the railroad companies would come to our aid in the matter of accurate returns. A small amount of encouragement from some of the prominent systems of the country would be a sufficient inducement to undertake the matter systematically; but there has been hitherto such apathy towards this important matter, and the lessons that might be obtained from good statistics, on the part of railroad managers as to make the time and expense necessary to the task appear labor in vain.

It has been suggested that Mr. Chas. P. Clark be appointed one of the Interstate Commerce Commissioners. Mr. Clark's brilliant record in twice rescuing the New York & New England from a financial slough is well known to the railroad world, and among those available for the office it can hardly be doubted that Mr. Clark, by his keen insight, his thorough knowledge of railroad affairs, and his high character for integrity, is as well fitted for the position as any one who could be named. Whether he himself would like the position, which is a semi-judicial one, may well be doubted, in view of the strong executive bent of his mind.

January earnings are reported this week by 31 roads, the totals being as follows:

	1887.	1886.	Increase.	P. c.
Reported this week, 31 roads.....	\$7,270,330	\$6,163,707	\$1,106,623	18.0
Total 34 roads.....	8,102,443	6,817,307	1,285,136	18.9

The increase in earnings this year has been on a comparatively small increase in mileage, but few of the lines which have thus far reported having had any considerable additions during the year. January earnings last year were generally light, however, and a decrease this year would have been a very poor showing.

All the roads reporting this week show increases over last year, many of them large. The gains are especially notable on the lines of the Central Group, where the Cairo, Vincennes & Chicago shows an increase of 58 per cent.; the Chicago & Atlantic 29.9; the Cincinnati, Hamilton & Dayton 14.4 and the Ohio

& Mississippi 6.2 per cent., while there are large increases on several minor roads.

In the Northwest the Chicago, Milwaukee & St. Paul gains only 3.2 per cent., while the St. Paul & Duluth, comparing with a poor month last year, had an increase of 90.4 per cent., the Wisconsin Central 32.6 per cent., and the Milwaukee & Northern 51.7 per cent. The Northwestern, the Omaha and the Chicago & Alton have given up the publication of weekly earnings, and their monthly statements, we understand, will not appear until later in the month, when actual instead of estimated figures can be given. The Canadian Pacific, in the far Northwest, shows an increase of 23.5 per cent., while the Northern Pacific increase was 12.9 per cent.

Three southwestern roads report, the St. Louis & San Francisco showing an increase of 36.7, the St. Louis, Arkansas & Texas 30.7, and the Fort Worth & Denver 7.8 per cent.

Of southern roads we have only two this week, the Louisville, New Orleans & Texas gaining 25.4 and the Norfolk & Western—which has come to be too much of a local and mineral road to give much indication of the course of southern traffic—20.3 per cent.

No eastern roads of importance are included in our tables this week, their reports coming usually later in the month.

The International Jubilee of Railways to be held in Paris this year, opening in May, is receiving increased attention from all quarters as the time draws near. Active preparations are now going on in the 900 acre park adjoining the Bois de Vincennes, near the lake Dumesnil; the palace for the exhibition is to cover from six to ten acres, and will be architecturally imposing, having busts of distinguished men of all nations to ornament the facade. Eight miles of track are to be laid, and typical national trains, representing France, Austria, Russia, etc. (with stations and personnel to correspond) are to be run. The French committee has received advices from various nations of interest manifested and active preparations going on; Brazil has instituted a preliminary exhibition at Rio Janeiro and will transplant the whole thing to Paris; England and Italy are making extensive arrangements, and "much is expected of the United States."

It is to be hoped that American energy and enterprise will take such a practical form that these great expectations may be justified. Europeans have to take our word for it when we boast of what we can do; now let us see that our actions back up our pretensions. The American road that shall step boldly forth and send over a whole train will quite likely find it turn out a really economical advertisement; or, if the expense be found to be unreasonably beyond any ordinary advertising venture, other American interests may be found ready to contribute a portion of the outlay.

The president of the committee of arrangements is M. Montaut, chief engineer of bridges and roads; other members are: De Lesseps, De Freycinet, Milaud, Minister of Public Works; Lockroy, Minister of Commerce; Granet, Minister of Posts and Telegraphs, and many others.

The forthcoming freight brake tests at Burlington are to be held in May, and not in April as was at first announced. Unless, however, the trials last an unusually long time they will be concluded some time before the meeting of the Master Car-Builders' Convention in June. It seems probable that no less than eight different systems of brakes will be represented; and as several varieties of electric brakes will be tested, the trials will undoubtedly be of great interest.

The list of tests and various rules governing them will be found in another column.

ARE INDEPENDENT WHEELS DESIRABLE?

Ever since the beginning of the railroad epoch, the minds of inventors have been more or less busy with the problem of getting rid of the slip of wheels on railroad curves, caused by the unequal distance traveled by the two wheels fixed on the same axle. To this day—so far as known to us—the little road from Paris to Sceaux is operated with radiating axles with wheels turning independently, an account of which may be found in one of the early volumes of *Engineering*.

That there is a loss of power from the use of coupled rigidly wheels by the axle is undeniable, but how much is still an open question.

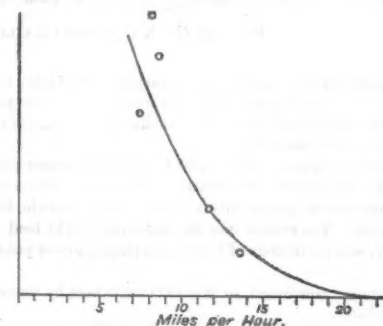
The table given by a correspondent in another column gives an interesting resumé of the experiments which have been made on this subject.

It is wanting in one particular, which we should be very glad to see supplied, viz., the speed at which the

various experiments were tried. This is given so far as the experiments of Mr. Wells are concerned, in the foot note to the table, and these experiments indicate a marked decrease of the advantages of independent wheels at high velocities.

The theory advanced by Mr. Wells at the time to account for this, that is, that the vibration in the rails and wheels produced by the high velocities had the effect of keeping the wheels in a semi-detached condition from the rails, is very plausible, and would without doubt account for part at least of this decrease. There is another element, however, which recent experiments on friction of motion by Thurston, Beauchamp-Tower, and notably of Wellington, indicate as being important in the matter, and that is the increased velocity of the slip with the increased velocity of the train. At low speeds this slip takes place at such low velocity that the friction caused by it is nearly that of repose, while at high train velocities, the velocity of the slip increasing proportionately, the co-efficient of friction would be diminished in a decreasing ratio, as shown by the curve in the diagram below, where it is interpolated as well as it can be from such imperfect data as the points marked by circles, which represent the advantages for traction found by Mr. Wells at the different train velocities for wheels turning independently, throwing out trials 24 and 25, whose results are quite abnormal and apparently due to some peculiar conditions. The curve has the general form of that found for the co-efficient of friction at different velocities.

The result, then, of these two agencies acting on the



tractive force is, according to Mr. Wells, that trains which maintain a speed of over 22 miles per hour require no more tractive force with wheels fixed on the axle than with wheels turning independently, while at 7 to 8 miles per hour the independent wheels have an advantage of from 8 to 17 per cent.

The deduction might be drawn from this that independent wheels would be of advantage on freight trains, where their advantage would come in at the very time when most needed, that is on a heavy grade when the speed was very much reduced. Assuming however, that the force of traction required on a level is as high as 10 lbs. per ton, and that an advantage of 25 per cent. might be attained, the traction on a level would be reduced to 7.5 lbs. On a one per cent. grade, (53 ft. per mile), which may be assumed as a grade stiff enough to reduce velocity to 8 miles per hour, the traction due to gravity would be 20 lbs. per ton, and the total traction therefore would be 27.5 lbs. per ton, against 30 lbs. with wheels fixed on the axles, a saving of 8 per cent.

As this saving would mean an addition of one car to every ten that the engine was able to handle on the above grade and still more on lower grades it would be important, if all of the above figures could be relied upon. Even granting, however, the 25 per cent. reduction in tractive power on a level, it is to be considered that the ten pound allowance for train resistance is a large one and is made up in good part of engine resistances, not affected by the kind of wheels used. There is also the additional complication and weight produced by any form of independent wheels, and above all the reason which was mainly operative in leading to the prohibition of independent wheels on the German roads, namely, the liability to derailment if one wheel sticks and the other runs, a thing which may be brought about by a variety of causes, such as a slightly increased grip of the brake on one side or a hot box.

RAILROAD TAXATION IN NEW JERSEY.

When the New Jersey Legislature has succeeded in getting fully organized, it will probably be called upon to consider some important matters affecting railroad taxation. This is made the leading subject of the Governor's message, and is likely to be actively dealt with at the present session.

The law of 1884 created a commission for deciding upon the taxable valuation of corporate property. This commission worked hard and conscientiously, and, as a

result, satisfied nobody. The railroads thought they were taxed too much; the other taxpayers generally thought that they ought to have been taxed more. The method of valuation adopted was a complicated one. Separate valuations were made on the main stem, the other real estate used for railroad purposes, the tangible personal property, and the franchises; the last item being, of course, the hardest to estimate. The commission itself does not appear to have been thoroughly consistent in the methods which it adopted; not basing the value of the franchise on the net earnings exclusively, since such an attempt would, on some railroads, have given the franchise a negative value—the net earnings not being sufficient to pay interest on cost of duplication.

The railroads objected to this method of valuation, and attempted to have the law declared unconstitutional. But the courts upheld the law as a whole, and, in a supplementary opinion recently rendered, Justice Beasley has given a detailed opinion on individual points. In this it is held that the distributive mode of valuation—different parts being assessed by different methods—is constitutional; that cost of acquisition is not an absolute criterion of value, but is an important element; that the particular cases of valuation complained of—including franchise values—are upheld, in the absence of distinct evidence to prove them exorbitant.

On the other hand, the arbitrary separation by the Board of railroad property into main stem and branches is held to be unwarranted in the absence of further revision; and the taxation of certain cars and engines in use on the leased lines of the Philadelphia & Reading Railroad Company was held to be an illegal interference with Inter-state commerce.

Section 4 of the act of 1884 directed that, in case the valuations of the State Board of railroad and canal property were relatively higher than the valuations of the property of other persons in any taxing district, as ascertained by the local assessors, the said board should accept the valuations of such local assessors as a correct standard. It was shown that the local assessors did not estimate property at what they deemed to be its full value, but only at a percentage of that amount. It was held that the state could not take such reduced valuations as its standard.

This fact has an important bearing on the points made in the Governor's message. He complains bitterly because corporations are not taxed as much as they equitably ought to be.

"The state has secured, during the past few years, results that are of great advantage to the people, but it has not yet obtained the full measure of equal taxation. The act of April 10, 1884, contains a limitation upon the taxation of railroad and canal property for local purposes, which excludes the main stem of railroads, the waterway of canals, and the tangible personal property and franchises of these corporations from any tax for local purposes, and also limits the rate, on the property remaining subject to local taxation, to 1 per cent. If these exemptions and the limitation were stricken from the act, these companies would substantially pay the same tax as individuals. If the real estate of these corporations was taxed at full local rates, less the one-half of 1 per cent. reserved for state purposes, this class of property, instead of paying for local uses in 1886 the sum of \$367,781.69, would pay the sum of \$1,230,162.41.

"The foregoing figures show a direct loss of \$862,380.72. This is an enormous subsidy contributed by the farmers, land owners, and other taxpayers of the state, for the benefit of these great corporations. Is this just? Only one answer can, in my judgment, be given."

If this inequality were a real one, it ought unquestionably to be stopped. But no one who is acquainted with tax machinery and taxing methods can believe it to be real. Governor Abbott, himself, can hardly believe it. The nominal tax of one and seven-tenths per cent. is not, as here assumed, levied on all existing property. A large part of the personal property of individuals escapes taxation altogether; the real estate of such persons is confessedly assessed at very much less than its true value; whereas railroad corporations have no relief in either of these respects. It is not probable that the valuation on which property taxes are based is more than half the real amount of property held by individuals. Such, at least, is the experience of other states. Now, seventeen mills on a half-valuation is only eight and one-half mills on a full valuation; and, if that be the case, the railroads are probably paying more than their share, instead of less. We should be surprised if this were not the case.

This may be wise policy. A great many authorities favor the increase of taxes on corporations as being much less expensive to collect, and, on the whole, involving less hardship. But if this is the real reason for such a system, it ought to be put forward as the reason. If corporations are taxed one per cent. (or, as some say, a little over $\frac{1}{10}$ of one per cent.) on a full valuation, and individuals $1\frac{7}{10}$ per cent. on a highly incomplete valuation, it is a mere trick and sham to base the plea for increased railroad taxation on grounds of equity. Let it be put on grounds of convenience, and understood as such.

THE WHITE RIVER DISASTER.

Almost exactly a month after the Republic horror, which excited every conscientious railroad manager's nerves to the highest pitch, and which furnished so solemn a warning that it would seem that even the dullest mind could not fail to take heed, comes an intensified repetition of almost the same simple lesson, as though the widespread and long-continued indifference and lethargy among intelligent men responsible every day for thousands of human lives demanded that a great human sacrifice be made so as to burn the warning into their hearts and consciences.

The lesson is simple and similar, because in both cases two very plain duties had been neglected: on the Baltimore & Ohio the heating of the cars and the discipline of the men; on the Central Vermont the heating of the cars, the same as in the other case, and the safety of the bridge; the latter being really a much easier matter to deal with than that of discipline, because the way has been so very plainly marked out by the best engineers.

As was said in these columns concerning liquor drinking, at the time of the Republic collision, if the lesson furnished by the burning of dozens of living people has not been already taken to heart, apparently no amount of mere words will impress it. We fully sympathize with those who have no patience with railroad presidents and superintendents and sleeping car managers who profess to be still faint hearted as to the possibility of remedying the existing state of things; who say that all experiments hitherto are failures, and carry the idea that they are going to sit with folded hands and wait for a perfected invention to be dropped into their laps. The newspapers which a month ago said that there was "no excuse for further delay" in abolishing individual car heaters, now repeat the same exhortation, simply substituting the word *must* for the less forcible expressions used before; but the lesson, whether expressed forcibly or otherwise, seems to have effect chiefly on those who, like legislators, can discharge their own duty in the premises merely by giving utterance to still more words. The effect seems to be thus, because, although hundreds of railroad men may have taken action, very little is heard about it. If crude and hampering laws are passed, the master car-builders and other responsible officers can largely blame themselves for not having gone to work at once, and for not having let the fact of their activity be known. No, if any one expects utterances from the *Gazette* on this question, he has but to turn to its back numbers, and not very far back, either. Truth in this line just at present needs hearers, not proclaimers.

But the one fatal lack at the bridge, which exists at thousands of similar places all over the country, which has been held up to view in these columns time and time again, and which has been remedied in a simple and inexpensive manner by scores of careful managers, was the absence of a proper guard rail and rerailing device. The evidence may not be wholly conclusive that these thirty or forty sacrificed lives would have been positively saved solely by this device in this instance, but the indications are overwhelmingly in that direction. We do not know how good a floor the bridge had, nor what strength the guard rail had so far as it went; but if any questions concerning permanent way may be regarded as settled they are those concerning the necessity of a strong and virtually continuous floor for bridges, of having the outside guard timbers extend beyond the ends of the bridge and of having them flared out at the end, and of having an iron V-shaped device or its equivalent between the rails to bring back into line any wheels that may on reaching it be not over 2 ft. 4 in. inside of the rail they belong on. Bridge sleepers ought not only to be close together—say 5 inches in the clear—but to be blocked so that there shall be no possibility of their being crowded up together by a derailed wheel. Outside guard timbers need to be not only large enough and strong enough in themselves, but must be bolted down so that they will break before they will yield their position and allow cars to strike the truss (in the case of through bridges). These timbers and the inner guard rail should extend each way from the bridge at least the minimum distance in which a passenger train is likely to be stopped after discovery of a derailment or defect in a vehicle.

If a train *must* be ditched, and is to get outside of the guard timbers, all possible means should be taken

to have this happen on favorable ground. It is very likely that in this case the loss of life and limb might have been mitigated if the cars had rolled down the bank, instead of dropping perpendicularly from the bridge; and probably a large share of high bridges of this kind are so situated that a moderate length of timber guard would extend back to a cut or to a comparatively easy embankment.

We see in this case, although the wise precaution of running at a low rate of speed had been adopted and was regularly practiced, yet a considerable distance was run after the cause of the trouble began to take effect. The precious interval between the time that some one felt the shock and started for the bell rope, and the moment that the engineman heard the gong and applied the brake, may have been 5 to 10 or more seconds, during which the train very likely ran from 100 to 200 ft.; and this distance very often makes all the difference between life and death. The trouble began 525 ft. at least before the bridge was reached, and if the brake had been applied instantly it should have easily stopped the train in considerably less than that distance. When the Westinghouse automatic brake was first brought out it had an attachment which was intended to strike the ground whenever the car jumped the track, and release the air at once, but we hear nothing about this appliance of late. Its use involved a good many vexatious delays, and it was discarded we believe as being "too much of a good thing." But no one can say that it would not have saved a score or two of lives in this year 1887; and those who ten or fifteen years ago shrank from the trouble or expense of persevering in its use can now see how real and vital a point may be, even if it does seem far in future. Other appliances for the same purpose have been devised and should receive careful attention.

In the hundreds and probably thousands of cases of dangerous bridges still in use without the proper safety rails and timbers at the approaches, the lesson for immediate application is plain; not only should a very low rate of speed be enforced for all trains, even to the point of changing time tables, but means should at once be taken to render the connection with the air-brake valve in every car very readily accessible from every part of it. Reduction of speed (and consequent loss of time) may seem like an antiquated makeshift, but who can feel safe under the above mentioned circumstances to do any other way?

HIGH SPEED LOCOMOTIVES.

The locomotive for the Shore Line express between New York and Boston, described in another column, possesses many of the typical characteristics of the latest style of express locomotive. The use of anthracite in order to get rid of the annoyance of the sparks and smoke of bituminous coal is a feature which is now found on many roads where soft coal is the cheapest and most easily handled fuel. A greatly increased boiler pressure is carried on the latest recent express engines built by the Lake Shore, Old Colony, and other roads. The use of the Allen Richardson valve is another feature which is becoming very generally used on engines designed to attain the greatest possible speed. The Shore Line engine therefore possesses many of the special features which are found in the most recent examples of express engines, but in one respect differs somewhat from usual practice. The weight on the drivers is no less than 72,000 lbs., while the truck carries only one-third of this weight. The reasons for this unusual distribution of weight are not very apparent. It is usually considered that the truck wheels should be loaded sufficiently to prevent any tendency to jump the track at a high speed, and that the drivers should not be loaded so heavily as to run any risk of injuring the track. Many engineers will consider that the limits of safety are somewhat closely approached by the distribution given above.

The locomotive in question is specially designed to run a train regularly at a higher speed than has ever been attained before. A speed of 40 miles per hour, including stops, is a high speed on a first-class line, and is rarely attained for any distance in regular running. Special trains are of course often run at higher speed, but the rate of 40 miles per hour, including stoppages, can only be maintained with any punctuality in daily running when the circumstances are favorable, the train not inordinately heavy, the grades and curves easy, and the average distance between stoppages at least 30 miles. When the train has to slack frequently at drawbridges or railroad crossings, such a speed cannot be maintained. The fact that such speeds are only attained by a very small number of trains in this country shows the difficulty of maintaining a high velocity for a considerable distance. The fastest train on the New York Central runs from New York to Buffalo, 440 miles, in 10 hours 45 minutes, or at the rate of

* A disinterested observer says:

"The burned bridge was of wood, built in 1858, and has since been strengthened by three braces. There was no iron guard rail, but a piece of timber 8 inches square, 18 inches outside the rails and rising 2 inches above the level of the rails extended the length of the bridge [only]. These are the only guard rails on Central Vermont bridges."

A letter in another column from a Boston correspondent also gives interesting points.

40.93 miles per hour. This can be done because the grades are remarkably favorable, and the stopping stations average no less than 110 miles apart. The Pennsylvania runs the limited express from Jersey City to Pittsburgh, 443 miles, in 11 hours 17 minutes, corresponding to a speed of 39.27 miles per hour, the average distance between stoppages being 110½ miles. The speed is fully 1½ miles slower than on the New York Central, showing the effects of the more unfavorable grades and curves. On a straighter track, the Pennsylvania attains a considerably higher speed, the fastest train between Jersey City and Washington covering the distance, 226.7 miles, in 5 hours 2 minutes, which gives a speed of 45.04 miles per hour. The distance from New York to Boston by the Boston & Albany route is 234 miles, and notwithstanding the keen competition and great through travel, the speed is only 39 miles per hour by the fastest train on this route, which covers the distance in 6 hours.

The fastest runs in regular work between any two stopping points give a speed of slightly over 53 miles per hour. Higher rates of speed have been obtained when making up time, but at present the average speed while in motion seems to be considerably under 60 miles per hour. Many trains doubtless fully attain that speed on a large portion of the run, but the time occupied in getting up speed after starting and slackening before stopping reduces the average speed to about 53 miles per hour.

These figures show the highest speeds attained on this continent for any considerable distance, and clearly demonstrate that the speed proposed on the N. Y. P. & B. is 2.5 miles in 62.5 minutes—including a stop at a drawbridge—is altogether exceptional in regular running.

The principal peculiarity of the engine that is to run at this exceptional speed is the enormous weight on the drivers, 72,000 lbs. Why such a weight should be necessary to attain a high speed is somewhat of a mystery. Adhesion is very necessary to enable an engine to start a train or to haul a heavy train up a steep grade, but complaints about engines slipping at high speeds are seldom heard. The difficulty is more generally the impossibility of getting the required speed out of the engine. In whatever position the reverse lever may be placed, the engine will not run to time. The reason has often been pointed out in these columns, and consists in the fact that at excessive speeds the steam is so wiredrawn in passing through the ports that the steam line is attenuated and sufficient pressure cannot be put on the piston to overcome the resistance of the train. The back pressure, too, is greatly increased, still further diminishing the size of the diagram. These difficulties can, however, be overcome in great measure by using slide valves with the Allen internal passage and large ports and exhaust nozzle. The more serious difficulty of making steam then remains, and can only be overcome by a liberal allowance of heating surface. All these points appear to have received attention in the engine under notice, and her performance will be awaited with considerable interest.

The enormous weight on the drivers, 72,000 lbs., concentrated on a short driver, 7 ft., is not apparently necessary in order to attain great speed, and is certainly calculated to throw a great strain on the permanent way and bridges. The danger of the practice of running engines with these exceptionally heavily weighted drivers at an exceptionally high speed must be patent to any one, and should receive the careful attention of railroad officers. The fearful consequences of a broken rail are shown in a lurid light by the holocaust on the Central Vermont, and an enormous weight on a pair of closely-coupled drivers are as potent a cause of broken rails and frogs as the prevalence of zero weather.

Railroad Competition and New York Trade.

The New York Railroad Commissioners speak with satisfaction of their recommendation in 1884 that a law should be passed preventing the consolidation of parallel or competing lines of railroad, and they point out that such a law would have prevented the Broadway Surface Railroad scandal, especially if it had been combined with another law, which they also recommended, insisting that such transactions be submitted to the approval of stockholders.

Against the second of these propositions we have nothing to say. Anything which will increase the control of legitimate owners over the directors who are supposed to represent them is greatly to be desired. But the attempt to prevent the lease of parallel lines, if carried out, would have had certain consequences which they do not mention. It would have made the present arrangement between the New York Central and the West Shore—which all persons now recognize as beneficial, and even necessary—an impossibility. The result would have been what always happens

when you try to prohibit a necessity—the law would have been evaded. Where railroad competition becomes destructive it must end in combination. If it can take the form of a pool, it does so. But, prohibit a pool from acquiring any legal right, and you force matters to a point where a lease becomes a necessity, unless all parties are to be ruined. This was what happened in the case of the West Shore; and if you had gone one step farther and made such a lease illegal, it would have forced an actual consolidation. This has been the fate of most laws intended to limit the validity of railroad agreements; instead of driving them back to a looser union, it has forced them on to a closer one.

It is a little strange that the Commissioners should cling to the idea that mere prohibition will keep competition active when there are overwhelming financial reasons to stop it. It is still stranger that they should hold to the idea that a railroad war somehow benefits New York.

"There was apprehension," they say, "that the leasing of the West Shore by the New York Central would result in the imposition of oppressive freight rates upon the large portion of the State reached by these lines, but so far no complaints of excessive rates against these roads have been lodged with the Board. It is to be hoped that this condition of affairs will continue, and that sufficient business at mutually satisfactory rates will offer itself."

In the very next paragraph they point out (though without noticing any causal connection) that the gain of the railroads in 1886 has been trifling compared with that of the canals. This is no new thing. As long ago as 1882 Mr. Fink pointed out in the most striking manner that such was an almost necessary result under present conditions. We quote from his Report upon the Adjustment of Railroad Transportation Rates to the Seaboard, p. 40:

"We find that during the navigable season of 1880, when rail rates were kept unusually high (5.3 cents higher than by lake and canal, 2.25 cents higher than by lake and rail), the railroads were enabled to carry 46 per cent. of the grain to New York—the canal carrying 54 per cent.; while in 1876, during the war of rates, when rail rates were very low—perhaps as low as the canal rates, if not lower—the railroads carried 65 per cent. and the canal only 35 per cent. But the total receipts at New York, by all routes, were less during that year than during any previous year since 1865. It is, therefore, evident that it is the true policy of the New York roads to keep their rail rates sufficiently above the canal rates, to secure for themselves a reasonable remuneration for their services, and at the same time to secure to New York some of the advantages of canal transportation."

A few figures from the Produce Exchange Reports will show how the canals lost business in 1876 and 1881 as well as in 1885, and will show how little benefit was obtained either from free canals or from the building of an additional trunk line. (The canals were made free in 1883.)

	New York's percentage of total receipts of the five Atlantic cities.				New York's percentage of total exports of the five Atlantic cities.
	Canal.	Rail.	Coast.	Total.	
1876.....	21.1	30.1	1.1	52.3	56.12
1876.....	15.6	28.2	2.0	45.8	44.13
1877.....	23.	24.8	2.0	50.3	50.10
1878.....	21.76	29.07	1.23	52.06	50.74
1879.....	17.15	30.66	1.25	49.06	49.75
1880.....	20.3	27.95	1.23	49.51	50.95
1881.....	14.31	36.91	1.17	52.39	52.80
1881.....	15.23	37.79	1.18	54.20	57.01
1883.....	17.2	33.1	1.6	51.9	45.8
1884.....	16.9	33.6	1.1	51.6	50.5

In the face of railroad duplication, free canals conspicuously failed to protect New York; and when it came to open war in 1885 they failed to protect themselves. Their tonnage which had risen from 5,400,000 in 1882 to 5,700,000 in 1883, fell to 4,700,000 in 1885.

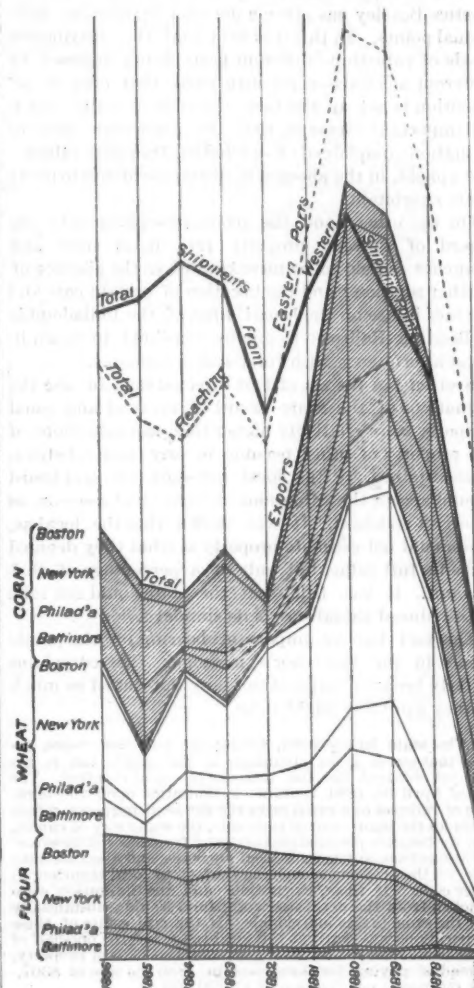
The canals are in a peculiar position. Thirty years ago high tolls were charged; in other words, there was an attempt to pay interest and maintenance, as well as traffic expenses. When the railroads came to compete with the canals the tolls were lowered, until finally, under improved methods of railroad economy, rates were brought so low that the canal traffic could not afford to pay any tolls at all; in other words, they gave up the attempt to pay fixed charges, and, by simply running for operating expenses were just strong enough to enable their boatmen to compete with the railroads as long as the railroads insisted on getting some contribution to interest and maintenance out of their through traffic. But when, owing to a rupture of agreements, the railroads went into the fight on the same level with the canals the canals lost business in spite of everything which could be done. This was the case in 1876, and again in 1881, and again in 1885.

Now this shows the folly of saying that the canal is naturally a cheaper method of transit than the railroad. It is dearer, if you compare operating expenses alone; it is dearer if you compare total expenses. It is cheaper only when you compare the operating expenses of the canal with the total expenses—includ-

ing maintenance and interest—of the railroad. So far from the canal regulating the rates of the railroads, it is the railroads and their attitude toward one another which decides the amount of traffic that may go by canal.

This being the case, those agreements of which the New York merchants complain have the effect of giving more business to New York, because they make canal traffic possible. Those who would have the railroads do business at cut rates, would not merely have to face the financial distress due to loss of interest, but they would adopt the surest means of depriving New York City of natural advantage over Philadelphia, Baltimore or Boston, which the Erie Canal has been the only means of giving.

The Movement of Flour, Wheat and Corn.*



We recently presented statistics showing the receipts of flour, wheat and corn at New York, Boston, Philadelphia and Baltimore during 1886, and also of the annual receipts for the nine previous years; and we now present similar statistics regarding the exports of these articles from the above named ports during the same period, with a diagram showing the grain movement graphically.

* In the diagram the width of each belt or zone on any year line shows the relative amount of the movement represented by the zone for the given year, and the widths of any combination of zones gives their relative importance for any year. The amounts represented by the lines of totals are, however, all plotted from the base directly, so that the varying width between them express the variations in their differences. Thus the distance on the 1886 line between "Total Receipts" and "Total Shipments" expresses the local consumption in the region to which the four ports distributed, and the distance on the same year line between the "Total Receipts" and "Total Exports" lines expresses approximately the consumption of western products between the western shipping points and the eastern markets. This cannot be got at accurately because the statistics for all western shipping points are not available. Those used in making up the diagram were Duluth, Chicago, Milwaukee, Peoria, St. Louis, Detroit, Toledo and Cleveland.

The flour is reduced to bushels, at the rate of 5 bushels to the barrel. Shipments of flour, wheat and corn from the Western Lake and River ports (Chicago, Milwaukee, Toledo, Detroit, Cleveland, St. Louis, Peoria and Duluth), during the last nine years, have been:

YEARS	Flour.		Wheat.	Corn.	Total.
	Barrels.	Bushels.	Bushels.	Bushels.	Bushels.
1886.....	1,105,674	55,525,370	58,826,325	81,755,125	196,107,020
1885.....	1,138,018	55,790,090	47,995,701	94,676,585	198,461,876
1884.....	12,335,853	61,779,265	65,033,440	84,216,856	210,425,091
1883.....	10,079,122	50,365,560	47,245,661	65,983,607	173,674,850
1882.....	8,745,826	43,720,130	58,470,972	69,600,331	176,537,259
1881.....	8,502,499	42,512,480	67,684,917	109,599,704	228,309,599
1880.....	6,009,744	30,048,720	68,647,770	126,155,292	224,861,786
1879.....	7,462,531	37,312,753	77,508,094	84,604,208	207,537,586
1878.....	6,164,351	30,821,735	65,574,366	79,014,632	175,414,773

NOTE.—This statement is compiled from weekly reports, and the shipments are not exactly for the calendar year, being in some years for 52 weeks and in other years for 53 weeks.

Last year the exports from the four ports were as follows :

	Flour. Bbls.	Wheat. Bushels.	Corn. Bushels.
New York.....	3,479,787	32,601,670	21,078,065
Boston.....	2,224,654	2,384,213	3,015,718
Philadelphia.....	316,507	8,114,212	1,899,594
Baltimore.....	1,542,469	10,564,791	14,124,944
Total, 1886.....	7,573,417	51,664,886	40,118,291
Total, 1885.....	7,276,852	50,793,608	50,295,860

The diagram shows that the receipts for domestic consumption did not differ much in the two years, and that the variations in the total receipts for the two years were in consequence of the fluctuations of the export demand.

The total annual exports of flour, wheat and corn, respectively, at the four ports for the last ten years, and the percentages of each port of the total annual exports of each article have been :

Year.	Percentage of each port of total exports.				
	New York.	Boston.	Philadelphia.	Balti.	more.
1886.....	45.9	29.5	4.2	20.4	15.0
1885.....	50.8	24.6	9.6	15.0	15.0
1884.....	57.0	31.7	4.9	6.4	15.0
1883.....	63.3	25.2	5.2	6.3	15.0
1882.....	71.3	18.6	3.0	7.1	15.0
1881.....	73.3	17.1	2.9	6.7	15.0
1880.....	71.8	15.7	4.2	8.3	15.0
1879.....	75.8	14.3	2.8	7.1	15.0
1878.....	70.7	9.7	4.7	14.9	15.0
1877.....	69.7	9.8	4.4	16.1	15.0

There has been a steady increase in the flour exports during the last ten years, though in the more recent years the increase has not been so great as during the first four years of the period. Attention is called to the fact that while the increase in the receipts of 1886 over those of 1877 is about 4,600,000 bbls., the increase in the exports last year over those of 1877 was, in round numbers, 5,300,000 bbls. Now it is only reasonable to suppose that with the natural increase of the population of the four cities, and of adjacent territory dependent upon them for supplies during the last ten years, there must have been a corresponding increase in the local consumption; but this does not appear to be shown by the reports. As the comparison of 1886 with 1877 is hardly a sufficient test, we will make a comparison of the four years ending with 1886 with the four years ending with 1880. The same result is arrived at; the average annual excess of total receipts over exports is the same for both periods—a little under 5,000,000 bbls. per annum. But as there has been beyond doubt a very considerable increase in the population, and as the average consumption per capita has probably not diminished, there can be no question that the total local consumption must have materially increased. The reason that this is not shown by a corresponding increase in the total receipts at the four ports is, that the method of doing business has been changed, and dealers at interior points who formerly purchased their supplies at the seaboard cities and had them reshipped to them, now buy in western markets and have their shipments forwarded direct to them at interior points.

Prior to 1885 the exports of flour at Baltimore, while not so small as the Philadelphia flour exports, usually, did not reach a half a million barrels per annum. But during the last two years there has been a very great change in this respect; the exports from Baltimore being nearly 1,100,000 barrels in 1885, and over 1,500,000 bbls. last year. It is evident that this increased business has been largely obtained by the diversion to Baltimore of traffic from territory that has heretofore forwarded its business via New York. Philadelphia does not appear to have lost much by the increase in Baltimore exports. The combined exports of flour from New York and Boston, as compared with the exports from Philadelphia and Baltimore, have been as follows, expressed in percentages of total exports :

	1886.	1885.	1884.	1883.	1882.	1881.	1880.	1879.	1878.	1877.
N. Y. and Bos.	75.4	75.4	88.7	88.4	89.4	90.4	90.4	90.4	90.4	90.4
Phila. and Balt.	24.6	24.6	11.3	11.6	10.6	9.6	12.5	9.9	19.6	20.5

Year.	Percentage of each port of total exports.				
	New York.	Boston.	Philadelphia.	Balti.	more.
1886.....	63.1	4.6	11.8	20.5	15.0
1885.....	65.1	4.1	13.1	17.7	15.0
1884.....	54.6	3.2	10.9	31.3	15.0
1883.....	51.6	1.7	10.5	36.2	15.0
1882.....	59.5	3.5	9.2	27.8	15.0
1881.....	56.8	4.3	13.2	26.7	15.0
1880.....	55.9	2.6	11.0	30.5	15.0
1879.....	53.4	4.2	14.9	27.5	15.0
1878.....	63.1	4.5	10.0	22.4	15.0
1877.....	71.7	5.1	8.4	14.8	15.0

While about double those of 1885, the total wheat exports from the four ports was only an average year's business. During the great export years, the exports from New York were in millions of bushels :

	1878.	1879.	1880.	1881.	1882.
55.2	62.3	61.9	41.8	37.6	

Next to New York, Baltimore is the most important wheat exporting city. Indeed from 1877 to 1880, its export traffic increased so rapidly that it was believed by many that it would become a far more dangerous rival to New York than it has since proved to be. In 1878 its wheat exports were 19,600,000 bushels; in 1879, 33,100,000; in 1880, 33,800,000. Last year it exported 10,600,000 bushels. Whenever there is a large crop of winter wheat in the territory which it can be reached, Baltimore has a much larger percentage of the total wheat exports than it does in other years.

The percentages of New York and Boston of the total wheat exports as compared with those of Philadelphia and Baltimore are :

	1886.	1885.	1884.	1883.	1882.
N. Y. and Boston.....	67.7	69.2	57.8	53.3	63.0
Phila. and Balt.....	32.3	30.8	42.2	46.7	37.0
1881.	1880.	1879.	1878.	1877.	
N. Y. and Boston.....	61.1	58.5	57.6	67.6	76.5
Phila. and Balt.....	38.9	41.5	42.4	32.4	23.5

Year.	Percentage of each port of total exports.				
	New York.	Boston.	Philadelphia.	Balti.	more.
1886.....	32.5	7.5	4.8	35.2	15.0
1885.....	33.4	7.3	12.0	37.3	15.0
1884.....	32.1	18.7	7.3	31.9	15.0
1883.....	55.5	10.1	12.6	21.8	15.0
1882.....	67.6	15.7	6.4	10.3	15.0
1881.....	59.3	14.2	11.0	21.5	15.0
1880.....	52.9	12.3	19.2	15.6	15.0
1879.....	45.3	8.8	17.8	27.1	15.0
1878.....	39.0	9.3	27.9	23.8	15.0
1877.....	45.3	5.3	17.3	32.2	15.0

The total exports of corn in 1886 were about the yearly average for the last six years; but, as shown in the above statement and by the diagram, there have been very great variations in the annual exports during that time. For the last seven years, the New York exports have been a little more than one-half of the total, except in 1882, when they were about two-thirds of the total.

Expressed in percentages of the total, the combined exports of corn from New York and Boston, and from Philadelphia and Baltimore, for the ten years have been :

	1886.	1885.	1884.	1883.	1882.
N. Y. and Boston.....	60.0	60.7	70.8	65.6	83.3
Phila. and Balt.....	40.0	39.3	29.2	34.4	16.7
1881.	1880.	1879.	1878.	1877.	
N. Y. and Boston.....	67.5	65.2	55.1	48.3	50.6
Phila. and Balt.....	32.5	34.8	44.9	51.7	49.5

The following summary shows in bushels the aggregate annual exports of flour, wheat and corn from the four ports during the last ten years, and the percentages of each port :

Year.	Percentage of each port of total exports.				
	New York.	Boston.	Philadelphia.	Balti.	more.
1886.....	55.1	12.3	7.5	25.1	15.0
1885.....	55.4	11.7	11.6	21.3	15.0
1884.....	54.7	14.8	8.4	27.1	15.0
1883.....	56.2	11.1	9.9	23.8	15.0
1882.....	63.7	9.2	7.2	19.9	15.0
1881.....	58.3	10.2	10.2	21.3	15.0
1880.....	65.5	8.0	13.6	21.9	15.0
1879.....	53.4	7.0	14.6	25.0	15.0
1878.....	54.2	6.9	16.7	22.2	15.0
1877.....	55.8	5.7	13.2	25.3	15.0

The combined percentages of New York and Boston, as compared with those of Philadelphia and Baltimore, are :

	1886.	1885.	1884.	1883.	1882.
New York and Boston.....	67.4	67.1	69.5	67.3	72.9
Phila. and Baltimore.....	32.6	32.9	30.5	32.7	27.1
1881.	1880.	1879.	1878.	1877.	
New York and Boston.....	68.5	64.5	60.4	61.1	61.5
Phila. and Baltimore.....	31.5	35.5	39.6	38.9	38.5

From the way in which the line of shipments crossed the export line in the earlier years of the diagram it is evident that the great western shipping points were in those years unable to supply the export trade alone, part of which came from the minor western points and possibly part from state further east.

In view of the great decrease of our exports while the western shipments continue fairly uniform, it appears that the decrease of the exports is caused by increased demand at home.

General Manager Hain of the New York City elevated lines writes the state railroad commissioners in response to inquiries from them, that changing the running of the Second and Third avenue trains so as to abolish the crossing where the recent collision occurred would work such inconvenience that the public would not submit to it, and that, therefore, he believes the most practical safeguard against future accidents is "to place an additional torpedo signal further back from the crossing and to place an additional flagman on the platform;" and these measures, he adds, will at once be adopted. While this is certainly a wise step and one that greatly enhances the degree of safety, there can be no question that the rule requiring the two men on the engine to look for the visual signal and to communicate with each other regarding it before they pass it; would in the long run be a substantial relief to the runner, and so, deserving of adoption; while at the same time it would provide against a possible failure of the torpedo.

A large proportion of the locomotives made by British firms are for export. Neilson & Co., of Glasgow, built 206 locomotives in 1885, of which 144 were exported. During 1886, only 152 engines were built by this firm, but over two-thirds of this output were exported, chiefly to India. A similar proportion probably holds good for other makers.

The "Outline of lectures delivered to third-year students of the school of political science of Columbia College" on the science of railroad management, by Prof. E. R. A. Seligman, shows a course of a very comprehensive character. The first part treats of railroad history, embracing chapters on English and American railroad development, and on that of the European continent. The second part treats of the relations of railroads to investors; the third handles their relation to the public; the fourth to their employees; the fifth treats of legislation, state and national, so far as already had in the United States; and the conclusion treats the question of state vs. private ownership.

Record of New Railroad Construction.

Information of the laying of track on new railroad lines in 1887 is given in the current number of the *Railroad Gazette* as follows :

Cape Fear & Yadkin Valley.—Extended from Stokesdale, N. C., northwest to Belvoir's Creek, 5 miles.
South Atlantic & Ohio.—Track laid from Bristol, Tenn., west to Mendota, Va., 15 miles.
Milwaukee, Lake Shore & Western.—A branch has been completed from Hurley, Wis., to Pence, 6 miles.
 This is a total of 26 miles for the week, making 181 miles

reported thus far for the current year. The new track reported to the corresponding date for 18 years has been :

	Miles.	Miles.	Miles.	Miles.	Miles.
1867.....	181	1883.....	163	1879.....	70
1868.....	91	1884.....	311	1878.....	136
1869.....	98	1885.....	173	1877.....	62
1870.....	147	1886.....	220	1876.....	70
				1875.....	151

This statement covers main track only, second or other additional tracks and sidings not being counted.

NEW PUBLICATIONS.

(Zur Erinnerung an die Eröffnung der Main Canalisation und der Frankfurter Hafen Anlagen.)

A handsomely-printed and artistically-covered pamphlet with a view of the improved city and with the above title is issued by the Chamber of Commerce of Frankfurt on the Main to commemorate the new era for the city inaugurated by the canalization of the Main from the Rhine at Mayence up to Frankfurt, in connection with the completion of the new harbor and a great union railroad station.

Frankfurt is one of the most progressive as well as the wealthiest cities in Europe, witness the above improvements, which are on a really magnificent scale, embracing the construction of two double track railroad bridges over the Main and a great number of highway bridges and miles of embankment, intended to give the new station every possible facility for connection with the half dozen railroads which centre there; also the great main drainage and precipitation works carried out under the direction of Mr. W. H. Lindley, one of the most distinguished sanitary engineers of Europe, Frankfurt also rejoices in a superb opera-house, in which one of the best opera companies in Germany is maintained largely at the city's expense; as is also the leading theatre. Its public schools are among its most conspicuous buildings, and money is appropriated by the city to education in a ratio whose increase is more than proportional to the squares of the increments of population.

The canalization referred to is effected by five weirs with corresponding locks, each lock 279 ft. long by 34 ft. 5 in. wide. The result of the whole is to give a slack water navigation with a minimum depth of 6 ft. 7 in., allowing vessels of 1,000 tons burden (the largest traversing the Rhine) to come to the Frankfurt wharves.

The canal works cost \$1,375,000; the new harbor and warehouses built under Mr. Lindley's direction \$1,125,000 already expended, and the magnificent railroad station and its yards and connections \$7,500,000. All this is done for a little city of about 150,000 people, in concert, however, with the Prussian government, at the expense of whose railroad budget the largest part of the works were carried out. The canalized river is made free of tolls by the imperial government.

The Main navigation began in the times of the Roman emperors, who built a paved tow path, traces of which still exist; and probably the river traffic was more active under them than it has been since, as it served as a link in the chain of communication between Rome and its Rhine provinces. The commotions of the middle ages, the tolls levied by several petty states on its course, and later the competition of the railroads, which cut across the great bends of the river, have almost destroyed its traffic and that of the Ludwig Canal, which connects the Main and the Danube, nearly on the course of a canal started by Charlemagne.

The removal of the custom duties by the consolidation of Germany and the use of chain towing, which is the only kind of power towing well adapted to the swift current of the river, seem likely, with the improvement of the lower Main to again develop the Main commerce as that of the Neckar has been of late years.

Locomotives and Locomotive Building in America. By M. N. Forney. Published by the Rogers Locomotive & Machine Works, Paterson, N. J.

This work traces the various improvements and modifications made in the details of American locomotives, and is mainly a history of the locomotive as developed by Thomas Rogers and Wm. S. Hudson, who for many years were the guiding minds of the Rogers Locomotive & Machine Works.

The gradual changes in the methods of fastening the cylinders, making the frames and other parts are very clearly shown, and the work is a valuable contribution to the history of the American locomotive.

Various forms of fireboxes, grates, fire-doors, chimneys, smoke-boxes, safety valves and other parts are illustrated and commented on, and the book deals largely with the details of a locomotive, recognizing what is too often lost sight of, that a good locomotive is but a collection of good details, and that correct proportions as regards the general dimensions of wheel base, heating surface, size of cylinders, etc., will not make up for faulty details.

A table showing the deliveries of locomotives from the Rogers Works for every year from 1857 to 1885 inclusive is very interesting, and many of the figures are very surprising. The fluctuations in the number of engines delivered annually are very considerable. In 1873 the output had reached its highest point since the first locomotive was built, but though 193 engines were built in 1873, the number had fallen to 19 in the following year. The output in 1877 was only 14 engines, most of them very small; and in no one year between 1874 and 1879 inclusive were more than 56 engines built. The next year, 1880, witnessed the commencement of a busier era, and the number gradually increased year by year until in 1883 the output reached 279 locomotives, the great majority of which had 17, 18 and 19-inch cylinders. It is, however, somewhat surprising that so many small engines still continue to be built. Some 14-inch cylinder locomotives have been built in every year since 1847, while, with the exception of one year, 15-inch cylinder engines have been built in every year since 1849. Some 17-inch cylinder engines were built

in every year from 1848-1852 inclusive, but after the latter date none appear to have been built until 1861.

It is stated that the full capacity of the works is thirty-three engines per month, which is equal to 396 engines per annum, but the actual annual output appears to have only exceeded half this figure in three years, 1881, '82 and '83, in each of which over 200 engines were built.

The following table which we have compiled from the figures given in the book under review shows approximately the total number of engines of each size built from 1837 to 1885 inclusive:

Size of cylinder.	Number built.	Date when first built.
11 in.	52	1837
12 "	80	1844
13 "	157	1847
Odd sizes below 14 in.	256	1838
" " " " " "	170	1846
14 in.	271	1847
15 "	545	1848
16 "	893	1849
17 "	523	1848
18 "	425	1849
19 "	124	1880
20 "	91	1880

Total..... 3,577

The latter part of the book is more of the nature of a catalogue, and contains perspective views and tables of probable performances of a great variety of types of locomotives. The method of calculating the probable hauling power of locomotives is clearly explained, but takes account only of the adhesion weight. The loads given in the tables can very probably be halved when the tractive force required does not exceed one-fourth the weight on the drivers, but such a coefficient cannot always be maintained. Even supposing that it could, the tables take no note of the fact that the tractive power of a locomotive also depends upon the average pressure of steam on the piston, and that any addition of weight on the drivers will not increase this average pressure, which must always be somewhat below the boiler pressure. It is also necessary to remember that the steam is more or less wire drawn as the speed increases, and that consequently the average pressure on the piston decreases as the speed increases. This has been shown pretty clearly in these columns. An examination of some indicator diagrams taken on a Delaware, Lackawanna & Western passenger engine shows that as the speed increased from 23 to 42 miles per hour, the mean effective pressure on the piston fell from 83 to 47 lbs. per sq. in.,* though the throttle opening and the cut-off remained unchanged. The effect of speed in modifying the average pressure of steam on the piston and the difficulty of keeping an engine in full gear when running fast are very important factors which hardly receive any notice in the work under review, but have a very marked influence on the tractive power of locomotive.

The neglect of these factors appears to have led to some misapprehensions as to the probable tractive power of locomotives. Tables are given showing the load that a passenger engine (American type) is capable of hauling at 30 miles per hour. The engine in question has 18 x 24 in. cylinders, 66 in. drivers, and 64,000 lbs. adhesion weight. It appears to be assumed that this engine can exert a tractive force of one-fourth this amount, or 16,000 lbs., at 30 miles per hour.

According to the usual formula in which D is the diameter of the cylinder in inches, d the diameter of the driving wheels on tread, and S the stroke of the piston:

$$\frac{D^2 S}{d} = T$$

when T equals the tractive power of the engine per lb. average pressure on the pistons. In this case, T is equal to 117.8 lbs. In order therefore to exert a tractive power of 16,000 lbs., the average pressure on the pistons throughout the stroke must be:

$$\frac{16,000}{117.8} = 135.8 \text{ lbs.}$$

It may well be doubted whether any engine working at ordinary boiler pressures could maintain such a high average pressure in the cylinders, even at a slow speed, and such a performance, at 30 miles per hour, would be very creditable in a locomotive with a boiler pressure of 180 or even 200 lbs. per sq. in. The actual average pressure in the cylinders of an ordinary locomotive rarely exceeds 100 lbs., and this is clearly shown by an examination of the various indicator diagrams that have appeared from time to time in these columns. Of some forty diagrams taken from different engines, under various circumstances, on the Cincinnati, New Orleans & Texas Pacific, not one shows as much as 100 lbs. average pressure.† The same may be said of some indicator diagrams taken on a Delaware, Lackawanna & Western passenger engine.* Two only out of twelve diagrams taken from a Norfolk & Western consolidation engine show an average pressure of over 100 lbs.‡

Even with special forms of valve gear, nothing approaching an average of 135.8 lbs. is recorded at a very slow speed, much less at 30 miles per hour, where the actual pressure is often 50 lbs. to 60 lbs. below that obtainable in the same grade of expansion with a perfect valve gear and an absolute vacuum.

Mr. Stevens' valve gear on "El Gobernador" gives, however, but 115 lbs. at a speed of 7 miles per hour.§ On another engine this motion has, however, given a somewhat higher average pressure.

Some trials were made some time since on the Boston & Albany on passenger engines with 160 lbs. boiler pressure, but the greatest average pressure in the cylinders fell just short of 100 lbs. per sq. in., though the speed was only 14 miles per hour.||

* See Railroad Gazette, Sep. 10, 1886.

† See Railroad Gazette, Jan. 2, 1885.

‡ See the Railroad Gazette, Oct. 9, 1835.

§ See Railroad Gazette, Oct. 8, 1885.

|| See Railroad Gazette, Nov. 10, 1882.

It would therefore appear to be tolerably evident that though an average pressure of 120 lbs. may be attained in full gear on the pistons, in practice such a pressure can only be obtained at very slow speeds, and is not reached at anything approaching 30 miles per hour. It therefore follows that the power of the engine in question is considerably overestimated, and that other considerations besides the weight on the drivers have to be taken into account in calculating the power of a locomotive, especially when running at 30 miles per hour. In order to exert the power named, 16,000 lbs. tractive force, the engine would have to indicate 1,280 horse-power, an amount which has in all probability never been given in fair actual working by any locomotive. A locomotive on the Brighton Railway in England was made to indicate nearly 1,000 horse-power by placing the lever in full gear while the engine was running down hill at 60 miles per hour. But such a result is a mere *tour de force* of no practical value, as no engine could maintain steam when worked in full gear at such a speed.

Some of the statements as to the power of the engines are even more erroneous than that already quoted.

It is stated on page 113 that an American type engine for passengers or freight will haul 1,264 tons on a level at 30 miles per hour. As the engine has 16 x 24 in. cylinders and 62-in. wheels, her tractive force is 99.1 lbs. per lb. average pressure on pistons. The table evidently assumes that she could exert a tractive force of 14,875 lbs., or one-fourth of her adhesion weight, 59,500 lbs. But

$$\frac{14,875}{99.1} = 150.1$$

and therefore the engine would have to maintain an average pressure on the pistons throughout the stroke of 150.1 lbs. per sq. in., or some 10 lbs. above the usual boiler pressure.

It is much to be regretted that such an oversight has been made in the method of calculating the power of the locomotives illustrated, as in other respects the book is a model of its kind, well printed and illustrated, and containing, in a compact and readable form, much information as to the development of the American locomotive, showing clearly that the present forms and proportions of parts have been gradually arrived at by a long series of practical experiments. With the correction of a few figures, the book will be of considerable value to all who take an interest in locomotives.

Why and Wherefore. Issued by the Passenger Department of the Chicago, Milwaukee & St. Paul.

Of course this little book does not answer all the *Whys* of life. If it did its publishers might go out of the railroad business and earn a Vanderbiltian income as a corporation, with the title of the Great American Oracle Company, Unlimited. It is the great big *Why* of life that is still waiting to be answered. The *Why* differs with individuals. In one case it is "Why can't I have a house and lot with a toboggan slide attachment?" Again it is "Why can't I eat deviled crabs at 1 a. m. and sleep like a pink cherub directly afterwards." This "*Why and Wherefore*" refrains from solving any such vital conundrums as these, but it states a great many compressed facts that you never knew anything about before, but are glad you know about now. It is a very nice and valuable little volume.

THE SCRAP HEAP.

Attempt at Train Wrecking.

A dispatch from Jacksonville, Fla., Jan. 30, says: "An unsuccessful attempt was made this evening to wreck a passenger train on the Florida Railway & Navigation road, 8 miles west of this city. Two negroes placed an iron rail across the track in front of the approaching train, but the officers, who had learned of their plans, arrived just in time to snatch the rail from the track and capture the scoundrels. One of the negroes, while talking with his companions, was heard to acknowledge the murder of three negroes at a festival in Warren County, Ga., some time ago.

"There were some 40 passengers on the train, and had the wreckers' plan succeeded the loss of life would have been great, as the obstruction was placed near a high trestle, down which the train must have inevitably gone. The passengers on the train were prevented with great difficulty from lynching the men when they heard of the attempt. The negroes are now in the county jail here. The direct cause of the attempt was a desire for revenge upon the engineer of the train for some fancied injury."

Austin Corbin on the Coal-Handlers' Strike.

"Then why do you do a coal business?" Judge Russell asked. "I can't tell you," Mr. Corbin replied. "The only profit we make is a small one in transporting the coal. Labor has received in those years several million dollars more than we have out of that business. I was called last year to Harriburg, where I was threatened with imprisonment for having entered into an agreement to keep coal at a price which would just pay for the mining. At the same time I was told that I would be removed from the Receivership unless I made a better showing of the road's affairs. The cost of transporting coal is only half what it was 10 years ago."

The cause of the strike, Mr. Corbin, said was the reduction by his road of the wages of topmen from 22½ to 20 cents per ton. The suggestion made by an Assemblyman that a uniform price of coal should result from a uniform price of labor was a beautiful idea, but it could not be brought about. He favored arbitration as a means of settling disputes, but the difficulty lay in devising a scheme of arbitration which would be binding. If one could be invented it could be applied to the disagreements among capitalists with advantage. The man would be a public benefactor who would find out some process which would bind men to abide by a decision of an arbitration board which was unfavorable to them. The trouble now was that the employees went out, not because they were dissatisfied, but because other employees were dissatisfied, and at the dictation of outsiders. If the men were left alone by these outsiders they would be less likely to go out, and more likely to come back after working out.

"If the leaders of workmen were workmen themselves you think there would be less trouble?" Judge Russell suggested.

"I would not like to answer that question," Mr. Corbin replied, "but I can deal all right with a committee of my

own men. The reduction in the wages of the topmen was caused by the condition of the local market, which had not for many years been so bad as at present. The Reading Company has sunk \$20,000,000 in the coal trade since it went into it."

Commissioner Sterne's European Investigations.

Simon Sterne, of New York, who was last year appointed a special commissioner by President Cleveland to investigate the relations of the governments of Western Europe to the railway systems within their jurisdictions, has submitted his report. It says in England governmental control and supervision over railroads of a much more exacting and rigorous character now exists than that which prevailed in the early history of railway enterprises there. A railway commission exists in England which has all the powers of a court of law to render judgment and enforce obedience thereto. The question is now being considered whether the commission shall be made one of the branches of the Supreme Court of Judicature. The commission has produced most satisfactory results.

In France in 1859 all construction by railways was subjected to state supervision, as were also rates. Under existing provisions France will become proprietor of all its railways between 1950 and 1960.

In Prussia, the entire railway system, comprising 20,000 miles of line, is the property of the state. The report, which is exceedingly voluminous, contains a review of the railway systems of Italy, Austria, Belgium and Holland.

The British Like Railroad Stocks.

There are 548,438 holders of railway stocks in Great Britain, of whom 448,053 are in England, 63,107 in Scotland and 35,278 in Ireland. As the population in 1886 was 36,707,000, it follows that one in every 67 persons is a holder of these stocks. The value of the stocks held is £831,354,310, and the average holding is £1,521, or, say, \$7,500.

Early Blast Furnaces.

The following extracts from a letter by Mr. J. W. Goodwin give an interesting picture of the beginnings of our iron industry:

That very valuable work, "The History of Iron in all Ages," written by Mr. J. M. Swank, widely known as the Secretary of the Iron and Steel Association of the United States, gives quite exact information as to the location and dates of establishment of the earliest blast furnaces operated in this country; but, as might have been expected, the author of the work in question was unable to discover, amid the obscurity with which Time has covered them, any very exact data concerning the very earliest furnaces of the country, viz.: those built in Massachusetts prior to 1760; which furnaces, we note in passing, were operated on "bog" ore exclusively. Nor can the present writer give the date at which any one of the older Massachusetts furnaces was originally built; but certain quite well preserved papers in his possession enable him to afford your readers some information as to the shape in which some of those ancient iron-producing establishments turned out their metal, and as to the prices at which their products were sold.

In 1760, and for some time prior thereto, Gen. Nathaniel Goodwin, of Plymouth, Mass., with several associates, operated two furnaces, one at Carver and one at Middleboro, near Plymouth. The Carver furnace is, I believe, still in operation.

During the disturbed times about 1812-1814, attempts were made to destroy the furnace, as witness a letter from one Ira Murdock to Gen. Goodwin, dated "Carver, 27 July, 1814," wherein Mr. Murdock states that the furnace buildings were fired early on the morning of the 27th by men who, after a sharp pursuit, escaped. Attempts of the same kind had been made in the June previous, and were repeated in August; but the strong guard kept at the furnace saved the property from serious damage.

Gen. Goodwin writes:

PLIMO, Dec. 12, 1766.
MR. SIM NEWELL: Sir: I have sent you a few kettles, dogs, (i. e., fire-dogs or and-irons) & Tea kettles as you order'd. Likewise 1 Doz. hand pots, 1 Doz. hand kettles, 1 Doz. 2 qt., 1 Doz. 1 qt. skillets, & 3 set cart boxes.

I have not so many kettles down from the furnace as you order'd, but shall send them next opp'ty with any other sort you shall order. Should be glad you would take the weight of them yourself, as I have not weigh'd them. Please to send by the bearer the Below mentioned articles. Also please to send back what Ref'd Iron is unsold. From your most humble servt.
NATH'L GOODWIN.

P. S.—The price of the hardware is as the last you had. The Tea kettles & Bales @ 7s.

3 stoves with frames.
1 Doz. handsaw files 22-6 O. T.
½ doz. double spring chest locks at abt 8½ pr. doz.
2 M pump nails. 1 Doz. large spike gimblets.
The "stoves" here named were "foot-stoves," and consisted of a small cast-iron fire pot inclosed in a box or "frame," the sides and top panels of which were of sheet iron, perforated in more or less fanciful patterns. Before starting for "meeting" on a winter Sunday a lady of the olden time would fill the fire pot of her stove with live coals from the wood fire, and during her ride to the meeting-house, and while in her pew, during service, would use the stove as a foot-warmer.

Below is "Invoice of Sundrys from the furnace at Middleborough," shipp'd on Board ye Schooner *Gull*, Charles Boul, Master, Bound [from Plymouth] to Marblehead, Sept. 1st, 1762:

186 Iron Potts.	
134 Iron Kettles.	Wt. 78, 3, 24.
11½ Set Cart Boxes.	@ 120 £ p. Ton.
18 pr. Dogs.	
6 hand pots, 9 £ p. Da.	
45 hand kettles, 9 £.	
63 Large skillets, 6-15.	
59 Qt. Ditto, 5.	
38 Pint Ditto, 3 15	
8 Pud'g Pans, 9 £.	
6 Large hd Potts, 10, 0, 0.	
6 fry kettles, 20 shillings a ps.	
17 small spiders, 8, 0, 0.	
8 Large Ditto, 9.	
2 Mortars, 20 shillings a p.	

The "120 £." given as price "per Ton" of the above named iron ware, is equivalent to \$589.20 present U. S. currency.

Pathfinders.

"Well, this beats me," as the Swampscott man, coming back from a long, lingering, troubled investigation of the gauge over the steam heater in the corner; "that there thermometer registers 78 degrees, and this car is colder than Greenland. Either the thermometer ain't good for nothing, or else I've got the Wabash Valley chills."

The train barely stopped the wheels at the station, but Ixion, the brakeman, roared the name so loud that the lights shuddered and went out. "Why did you make such a base bawl as that?" asked the cross passenger. "Because," replied the man at the wheel, "it was a short stop."

"What did your father do with your skates, Johnny?" asked the school-teacher, seeing one of her pupils in the next seat. "He took 'em to Salem," said the boy. "He took

them to sell them, you mean," she corrected him pleasantly. "It's just as well, perhaps; the ice is not very safe just now." And the boy stared at her, and joyously made up his mind that the teacher had gone crazy and there would be no school next week.

"There goes your hat!" yelled the brakeman, as Mr. Barnborn opened the car window and thrust out his head, neck and shoulders in order to see the fence at the side of the track. "No it doesn't," said Mr. Barnborn, looking back where it was stuck, firm as a rock, in the weeds; "the hat isn't goin' at all. Here goes your old train!" And then he kept his window down, having no other hat to lose. Hats come high, especially the ladies' hats; but it's worth a whole box of them to teach a man that window-glass is transparent, and that he doesn't see with his shoulder-blades.—*Burdette, in Pathfinder Guide for February.*

Philanthropy.

The locomotive firm of H. K. Porter & Co., of Pittsburgh, Pa., has given cash prizes to their employes, the bosses to receive \$50 each, the gang bosses \$25 each, the journeymen \$15 each, the laborers \$10 each, and the apprentices \$5 each. This is to show appreciation for the good work done by the men during the past year.

Beautiful Snow.

There has been an unusual amount of snow in Idaho this winter. The Anaconda reducing works near Butte, Montana, are shut down for want of coal, the coal trains being completely stalled by the snow on the Utah & Northern, nearly the whole power of the road being used on snow plows, flangers and passenger trains, necessitating the freight trains being abandoned.

A Terrible Bore.

A company with a capital of \$5,000,000 has been organized to undertake the construction of a submarine tunnel between Prince Edward Island and New Brunswick, provided the Dominion government will guarantee 4 per cent. interest on the expenditure. It is claimed the tunnel will shorten the distance between Liverpool and Canadian ports several hours.

The Long and Short of it.

"Why, anybody ought to know that it's the short haul that costs the most. You see, I am sitting in a railway parlor car down in Maine writing a postal-card to a friend in Oregon. Now, if I can get that card to the mail car, only seven car lengths ahead of me, the government will carry it 3,000 miles for one cent. That is the long haul. But it costs me a quarter to get the porter to carry it to the postal car. That's the short haul. Then the porter loses it on his way or forgets all about it. That's the shrinkage. And there you have the whole transportation problem in a nutshell."—*Robert Burdette.*

Bobbed up Serenely from Below.

An engine belonging to the Atchison, Topeka & Santa Fe has just been resurrected after being buried nearly two years near Randall Station, near the Rio Grande River. At that time the engine ran into a washout and soon disappeared in the wet sand and baffled all efforts of the company to find her until a short time ago. In the meantime the river bed changed and the track was moved from the encroaching stream, and the engine now stands on the other side of the river. A temporary bridge is being erected to run her on the main line. The engine is almost dismantled but otherwise in a good state of preservation.

What is Yours is Mine, and What is Mine is Mine.

At a meeting of a Colorado mine's shareholders held in Indiana the other day one of the directors presented a bill of expenses which included \$36 for wines, \$20 for cigars, and \$18 for opera tickets, these expenses having been contracted in Chicago while he was having a map of the mine engraved.

There was a hot protest when the bill was presented, and the director calmly tore it into small bits and replied:

"I had supposed this mine was to be run for the benefit of the board. If it is to be run in the interest of shareholders that settles me, and here's my resignation."—*Wall Street News.*

Rare Bits.

Jack rabbits shipped from Oregon and Idaho to Chicago turn up in the market as canned chicken, and are shipped back to the country from whence they came as such.—*Boise City (Idaho) Statesman.*

Not Far; Only to the Jail.

Joseph G. Farr, the former Traveling Auditor of the Long Island Railroad, is now living at Kings County jail. He had a little way of taking nice round sums, like \$5 or more, from the various ticket agents that he visited. As an officer of the Long Island road, Joseph has appropriated his very last \$5.

The Accident at White River, Vermont.

The most terrible railroad calamity in New England since the Norwalk drawbridge horror in 1853, and the worst in the country since Ashutaba, occurred at 2 a. m., Feb. 5, on the Central Vermont road at the crossing of White River, 3½ miles north of White River Junction, Vt. The regular north bound passenger train, consisting of engine, 1 baggage, 1 combination mail and smoking, 2 day and 2 sleeping cars, approaching a wooden deck bridge some 50 or 60 feet above the frozen river below, was derailed just before reaching the bridge and while running at about 10 miles an hour, and the four rear cars toppled off at the right hand side, just as the whole train had got fairly on to the bridge, lodging on their tops and sides upon the thick ice, and crushing most of the passengers among a confused mass of broken timbers. The rear car was the only one originally derailed, apparently; and this seems to have got far enough away from the track by the time it got on to the bridge—there being no guard rail or other safety device until the bridge was reached—to tip off at the side and pull the next three cars with it. The engine and the two cars next it remained on the track and were stopped before they had cleared the bridge, which was about 650 ft. long. The night was intensely cold, the temperature having dropped in a few hours from zero to 35 degrees below, if the reports are to be trusted. The engineers and others on the forward portion of the train at once ran to the help of those in the wreck, but succeeded in saving only a few before fire from the heaters in the cars drove them off; and in less than half an hour cars, passengers and bridge were consumed in one horrible funeral pyre, the details of which no pen can picture.

The latest estimates place the total number of persons on the train at 84, including trainmen; 32 bodies were taken out of the wreck; 44 people were injured, of whom 2 have died and 18 are classed as only slightly hurt, leaving 2 missing. Only 15 bodies have yet been identified, and the exact number of killed may never be known.

The cause of the derailment was undoubtedly either a broken rail or a broken axle, the evidence thus far tending strongly to show that it was the latter. The middle axle of the forward truck of the Pullman sleeper "Pilgrim" was found broken, and a safety strap belonging to such a truck was found on the track at a point where it apparently

dropped off before the point where the rail broke was reached. An investigation by the state railroad commissioners is in progress, and seems thus far to go very carefully and intelligently into all the details and contributing causes of the disaster. The railroad officers are accused of treating inquirers after missing passengers in a very narrow, arbitrary and unfeeling manner, and of trying with unseemly haste to make final settlements with injured passengers and friends of the dead.

TECHNICAL.

Locomotive Building.

The Atchison, Topeka & Santa Fe Co. has given out orders for new locomotives as follows: 44 to the Baldwin Locomotive Works, Philadelphia; 30 to the Manchester Locomotive Works, Manchester, N. H.; 18 to the Schenectady Locomotive Works, Schenectady, N. Y.; 10 to the Taunton Locomotive Manufacturing Co., Taunton, Mass.; 10 to the Pittsburgh Locomotive Works.

The Central Vermont shops at St. Albans, Vt., have just completed a new passenger engine for the road. It has 18 by 24 in. cylinders and driving wheels 68 in. diameter. The boiler is 50 in. diameter of barrel, and has 200 tubes 2 in. diameter. The fire-box is 66 in. long and 35 in. wide inside. The truck wheels are steel tired. The tender is mounted on steel-tired wheels, and the tank has a capacity of 3,000 gallons. The engine is intended to run on through passenger trains.

The Car Shops.

The Laconia Car Co., Laconia, N. H., is building 250 freight cars for the Boston & Maine road, 250 for the Boston & Lowell, 50 bark cars for a private party in Winchester, Mass., and 6 passenger cars for the Boston & Lowell road.

The latter will have the Mann roof, and each car is to have two saloons and a lavatory. They will be finished in solid mahogany, upholstered with old gold plush and heated by Baker heater. They will also have 42-in. steel wheels.

The company is also building 5 passenger cars and one smoker for the Boston, Revere Beach & Lynn road. They will be heated with hot water by a wrought iron heater, with which Mr. Coughlin, the master car-builder of the road, has been experimenting, and which is his own invention.

The Bradley Car Works at Worcester, Mass., are building 20 round roof passenger cars for the Boston & Lowell road, 5 suburban and 4 passenger cars for the Chicago & Eastern Illinois road.

The works are running on full time, and cannot make any deliveries until August.

The St. Charles (Mo.) Car Co. has contracted with the Chicago, Kansas & Western for the building of 1,880 stock, coal and flat cars, and 28 coach, mail and baggage cars. It is also constructing 1,100 cars, mostly freight, and 10 tourist cars for the Atchison, Topeka & Santa Fe. The company will also build flat cars for the St. Louis & Colorado and for the Kansas City, Fort Scott & Gulf.

The Michigan Car Co. recently declined to bid for 5,500 freight cars, for the present pressure of business permits of no additional work.

The Westinghouse Air Brake Company of Pittsburgh have just ordered 50 freight cars from the car shops at Altoona, which they will use for their own private purpose. They will experiment on the cars.

The Wagner Car Shops in Buffalo are making experiments in the electric lighting of cars by the Edison system, with a view to the adoption of some plan to be used on trains, using a dynamo on the engine as a source of electricity.

Manufacturing and Business.

The Westcott Chuck Co. on Feb. 1 succeeded to the business of the Oneida Steam Engine & Foundry Co., of Oneida, N. Y. The new company will continue the manufacture of chucks under the several patents of John H. Westcott. The old managers continue with the new company.

The Wainwright Mfg. Co. of Boston have recently filled an order for corrugated expansion joints for the Brooks Locomotive Works, Dunkirk, N. Y.

The Betts Fence Co., of Palmer, Mass., will begin work at once on a large order for their patent combination wire and picket fencing for the Boston & Albany road.

Iron and Steel.

The Knoxville Car Wheel Company, Knoxville, Tenn., are erecting a boiler shop.

It is stated that a large iron mill, in which the Chapin "pneumatic process" will be put in operation, will be built in Pittsburgh next spring. Dr. L. B. Chapin, of Chicago, is the controller of the process.

The Variety Iron Works of Cleveland have received orders for eight 60 in. x 18 ft. tubular boilers, fitted with Butman fire front, automatic doors and shaking grates, and six 12 ft. x 24 ft. grainers, all for George W. Kidd, to be used in a salt plant he is erecting in New York state. They have also received orders for three 66 in. x 18 ft. tubular boilers, with ornamental vertical fire front, for the Cleveland Stone Co., and two 72 in. x 18 ft. tubular boilers, with ornamental vertical fire front and Butman automatic fire doors and shaking grates, for Nashville, Tenn.

Aurora Furnace at Wrightsville, York County, Pa., operated by Schall, Steacy & Denney, has been remodeled, and it was expected to be in blast about the middle of January.

The Colorado Coal & Iron Co. reports that it will shortly add 50 new coke ovens to its plant at Crested Butte, Col. The Worcester Steel Works are very busy at present, making 60 wheels and 90 tons of wire billets a day. They employ 325 men and have enough orders to keep them employed for some time.

The new rail mill which will be built at Braddock, Pa., by Carnegie Brothers & Co., will cost \$1,000,000, and will have capacity to manufacture 400,000 tons of rails a year, about one-third of the entire production of the country.

The Spring Lake Iron Co. has leased the Bangor Furnace at Bangor, Mich., and will take possession on June 1.

The Rail Market.

Steel Rails.—Quotations continue at \$39@40 per ton at eastern mills. The market is quiet at present, but firm, and many inquiries for late deliveries are reported.

Rail Fastenings.—The market is active and a good demand reported. Quotations are steady at 2.60 cents per lb. for spikes in Pittsburgh; 3.15@3.30 for track-bolts and 2@2.10 for splice-bars.

Old Rails.—The market for old iron rails is active, with prices slightly lower, quotations being \$25@26 per ton at tidewater. Old steel rails are dull with quotations nominal at \$24@26 per ton in Pittsburgh.

Contractors' News.

The Pennsylvania Railroad Co. invites proposals for furnishing all labor and materials, and performing the work necessary to complete the graduation and masonry on the New York Division of the road for two additional tracks; bids received till Feb. 10. The work is as follows:

- (1) From Bear Swamp to west end Monmouth Junction, a distance of about 7 miles.
- (2) From Monmouth Junction to Millstone Junction, a distance of about 8 miles; and for four additional tracks.
- (3) From Metuchen to Menlo Park, a distance of about 1½ miles.

For information as to the above work application may be made to
W. H. BROWN,
Chief Engineer Pennsylvania Railroad, Philadelphia, Pa.

Venetian Glass Deck Lights.

Some novel and handsome designs in colored glass for deck lights have been lately introduced on the Pennsylvania, Lehigh Valley and other roads. The method of manufacture is peculiar, a variety of glass of different colors being melted separately and then mixed in one pot, and the results are very striking resembling the old Venetian glass. This peculiar process is carried on by Louis Weidt & Bros., of Brooklyn.

A New Supply of Iron Ore.

The London Engineer states, on the authority of diplomatic and consular reports, that the approaching opening of the Lulea & Ofoten Railroad in the extreme north of Sweden will have a very important effect upon British iron industries. The railroad is designed to bring iron ore from the mountains of Gellvara to the harbor of Ofoten on the western coast of Norway. The ore contains about 70 per cent. of metallic iron, and it is calculated that the ores can be delivered in the North of England at a price per ton not exceeding those of the Bilbao mines, which contain 20 per cent. less of metallic iron. Though Ofoten is little south of the Arctic circle, the influence of the gulf stream maintains the average winter temperature at only 28° Fahr., and therefore no trouble is expected from ice.

New Express Engine.

The following description is condensed from the *Providence Journal*: The Rhode Island Locomotive Works have just completed for the New York, Providence & Boston Railroad, what is claimed will prove the fastest and most powerful passenger locomotive in America. The engine is named after Mr. J. W. Miller, the new General Manager of the road. The Miller is to haul the fast Shore Line train leaving Providence at 2:03 p. m. for New York as far as Groton Ferry Landing. This is already the fastest division of the Shore Line by schedule, the distance, 62½ miles, being run in 1 hour 17 minutes. The new engine is to haul a train of 8 cars, 4 of them Pullmans, between Providence and Groton Ferry Landing, 62.5 miles, in 62.5 minutes, the train to make one stop only, namely, at Mystic Drawbridge. This calls for a speed of a mile a minute, including two starts and two stops. The grade rises from Providence. The notable fast run on the Pennsylvania Railway from Jersey City to Philadelphia, is made with not more than 6 cars.

The engine is an anthracite burner, of the American type, with four coupled wheels and a four-wheel rigid centre-bearing truck.

The engine Connecticut, which the Miller will supplant, ran last year 32,328 miles in 256 days. The Miller embodies improvements suggested by Mr. M. L. Butler, the master mechanic, who has attentively studied the Connecticut's performance. A comparison of the more notable points of difference between the two is afforded by the subjoined table.

	J. W. Miller.	Connecticut.
Cylinders.....	18 x 24 in.	18 x 24 in.
Fuel.....	Anthracite	Bituminous.
Driving wheel base.....	7 ft.	8 ft. 6 in.
Total wheel base, engine.....	21 ft.	23 ft. 3¼ in.
Total wheel base, engine and tender.....	46 ft.	44 ft. 6½ in.
Weight on drivers.....	96,000 lbs.	90,800 lbs.
Weight on truck.....	72,000 lbs.	51,200 lbs.
Weight of tender.....	24,000 lbs.	31,050 lbs.
Weight of boiler.....	62,000 lbs.	58,000 lbs.
Boiler.....	Otis steel.	Nashua steel.
Waist diameter.....	¼ in. thick.	¾ in. thick.
Number of 2 in. tubes.....	54 in.	52 in.
Length of tubes.....	218	200
Driving wheels, diameter.....	10 ft. 4¾ in.	11 ft. 10¼ in.
" tires.....	Midvale steel.	Nashua steel.
axles.....	Krupp crucible steel.	Nashua steel.
Journals, diam.....	8 in.	7¾ in.
length.....	8 in.	
Heating surfaces, tubes.....	1,392.6 sq. ft.	1,245.7 sq. ft.
fire-box.....	165.5 sq. ft.	141.0 sq. ft.
Total.....	1,558.1 sq. ft.	1,386.7 sq. ft.
Grate area.....	37.6 sq. ft.	
Length and width fire-box.....	126 in. x 43 in.	
Depth front end.....	22 in.	
Boiler pressure.....	180 lbs.	
Diameter exhaust nozzle.....	4 in.	

The distinguishing features of the Miller is the increased steaming capacity and pressure and the additional weight on the driving wheels securing requisite adhesion. With a cylinder diameter the same as the Connecticut, the engine now working the train, the Miller's total weight exceeds the Connecticut's by only 5,200 lbs., but the weight on the drivers shows the enormous excess of 30,800 lbs. The Miller is an anthracite burner.

Just in the rear of the forward drivers the main frame slants forward and downward to accommodate the slope of the bottom of the fire-box, and this device allows a fire 22 in. deep in the forward end, just under the flues. The water grates are of the best lap-welded tubing, 2 in. in diameter, and the water space about the fire-box is 3 in. wide at the sides, 3½ in. at the back, and 3¼ in. to 4¼ in. at the front. The ash-pan is provided with hoppers.

The wagon top swells out to the full size of the perfect cylinder, instead of flattening, as is frequently the practice. Though the wheels appear to run very near the boiler, the boiler would bring up on the frame in the event of the breaking of a spring before the wheels could touch it.

The boiler is made of ¾ in. Otis steel, riveted with ¾ in. rivets placed not over 2¼ in. from centre to centre, with the customary double riveting, with an extra welt piece riveted inside the side sheets, providing a double thickness of metal for the expansion pad studs. All the boiler sheets were tested under a requirement that they should show a tensile strength of not less than 55,000 nor more than 65,000 lbs. per sq. in. of section, and a ductility or elongation of 25 per cent. The boiler is of wagon-top style, is 54 in. in diameter at the smoke-box end, and is provided with a dome 30 in. in diameter placed on the wagon top.

The tubes are of best charcoal iron, No. 13 Birmingham wire gauge, tested and guaranteed by the manufacturer and equipped with copper ferrules on the fire-box end. The stay-bolts, ¾ in. in dia., of the very best staybolt iron tested by bending, are screwed and riveted to the sheets, and are not over 4¼ in. from centre to centre. The boiler has an extension arch. The boiler was tested to 135 lbs. per sq. in. before the lagging was put on.

The connecting rods are of steel forged solid, with straps and keys. The side rods are made with solid ends and brass bushing bored to fit and secured to the crank pin by hexagonal nuts. These rods have their edges finished in a half circle. The crank pins are of steel.

The cylinders are of close-grained iron, each cylinder cast in one piece with half the saddle, placed horizontally; right and left hand cylinders, reversible and interchangeable. The piston heads and followers are of cast-iron, fitted with cast-iron ring packing, piston rods of steel, keyed to crossheads of steel. The valves are the Allen-Richardson balance, and the motion is the ordinary shifting link.

The driving wheel rims are cast in sections to relieve the wheels of the shrinkage strain. The tires are 5½ in. face and 3 in. thick, both pairs flanged. The springs are A. French & Co.'s, of best cast steel.

Boiler and cylinders are lagged with asbestos and jacketed with Russia iron, with bands of the same material. All the ornamental finish, which is of brass on most locomotives, such as running board nosings and wheel cover nosings, are of iron on the Miller. The wheels are painted red and the rods polished.

The stack is straight and short as befits her height, the sand-box and steam dome are covered with iron cast in the easy flowing curves, borrowed in substance from the English, but which are rapidly coming into favor in this country. The boiler, cylinders and dome are lagged with asbestos and jacketed with iron. The casings of the cylinders and the sand-box and dome are painted, and the sand-box bears the machine's number in gilt figures.

The cab is on top of the boiler, and the engineer and fireman work on different levels. Feed water is supplied by two No. 9 Mack injectors, one on either side, with a patent feed-water heater in the smoke-box connected with the right-hand injector.

A combination stand, original with the Rhode Island Locomotive Works, accommodates all the steam fittings with but one opening from the boiler. An ingenious device is calculated to prevent that frequent casualty, the scalding of the engineer or fireman by the escape of steam from fittings knocked off by the shock of an accident. In the combination stand is a hard metal point which presses down upon a valve, keeping it open and allowing the steam access to the stand. If the stand should be knocked off, the valve would be released and the whole of the steam pressure would be exerted against it, to prevent the escape of steam through the only available opening.

The cylinders are lubricated by Seibert oilers placed in the cab and connected with the steam chests by copper pipes running under the jacket of the boiler. The whistle is a Crosby five-inch chime. The engine is equipped with Westinghouse automatic air brake for drivers, tender and for the train.

The engine truck is rigid centre bearing and is carried by four Hartford steel-tired spoke wheels, 33 in. dia. The axles are of best hammered iron, with inside journals $5\frac{1}{2}$ in. dia. and 8 in. long.

The tender carries four tons of coal and 3,500 gallons of water. The back end of the tank is pitched one inch toward the coal space to drain the water off. The tender frame is built of channel iron strongly braced. The wheels are of the same description as those of the engine truck.

The new engine will probably not be put on the Shore Line train for several weeks.

The Make-up of Mixed Trains.

An English railroad paper states that, in reporting upon an accident which occurred on the Highland line between Mulben and Keith, in September last, where the vehicles of a mixed train left the rails, Maj.-Gen. Hutchinson, Inspecting Officer to the Board of Trade, reiterated his opinion that for greater safety the goods wagons in mixed trains should be placed behind the passenger carriages, and not in front. The Board of Trade officers persistently stick to this theory, and pronounce it with weary iteration, albeit it is condemned by every skilled railway officer in the three kingdoms, alike on the score of safety and convenience.

Steel Ties in Mexico.

The Mexican Railway (Vera Cruz to Mexico), says the *Mexican Financier*, began using steel ties in 1884, and now has some 20,000 in use. Forty thousand have been ordered from England, where they cost \$1.25 in gold each. They can be laid down at a cost not to exceed \$2, Mexican silver. The wooden ties displaced cost from 90 cents to \$1.62 in silver. The life of the steel tie, it is believed, will be from thirty to fifty years. In India steel is being used in place of teak, one of the best woods.

Secondary Batteries.

The following gives a general idea of the lines upon which secondary battery inventors are now chiefly working. It is from a patent specification of S. Farbaky and Dr. S. Schenck, Hungary—Eng. pat. 13,697, Nov. 10, 1885, 8d. The plates consist of lead grids, the interstices of which are packed with a special material; for negative plates this material consists of 95 parts by weight pulverized litharge and 5 parts granulated pumice stone, the grains being from 1 to $1\frac{1}{2}$ mm. in diameter. Enough sulphuric acid is added to form a stiff paste; the mass is spread over the lead grids and "stroked with a brass bar until there is a visible sweat on the surface;" the material projecting above the lead frame being pared off with a long knife. The other side of the plate is treated in the same manner. The packing for positive plates consists of 95 parts by weight of litharge, 95 parts minium and 10 parts powdered coke. The coke and pumicestone give porosity, and thus facilitate the entry and escape of the electrolyte. The plates, when dry, are dipped into a bath of sulphuric acid diluted with 75 per cent. of water, rapidly removed and left to drain; after about 24 hours they are again dipped in the bath and left there for 12 hours. This treatment helps to maintain the packing in position. The plates are packed in air-tight cells, the connecting-rods projecting through the cover.—*Engineer* (London).

A New Process of Furnishing Fuel.

The American Gas Light and Heat Company have given several exhibitions lately of the power and quality of the gas and heat produced by the Benninghoff process in their establishment at Darby, near Philadelphia. Among those present were Dr. Francis Lee Clere (Franklin Institute), Professor William D. Marks (University of Pennsylvania), S. P. Williams (Henry Disston & Sons), Mr. Hoopes (Hoopes & Townsend), John F. Glosser (Pullman Palace Car Co.), W. C. Allison (car works), Thomas Shaw, and others.

The company is organized for the purpose of furnishing heat and light to dwelling houses and manufacturing establishments on the same general principle as that by which natural gas is introduced for similar purposes and as cheaply. There is no danger, it is claimed, and no smell incident to its use.

The plant of the company consists of the Newell gas bench. The material furnished for combustion and lighting consists of hydro-carbon gas mixed with one hundred times the quantity of atmospheric air. The gas is made from crude petroleum alone, with superheated steam. The company also claim that their gas goes one-third further than any other coal gas and will enrich coal and natural gas as an illuminator, and gives to the former a pure white and exceedingly bright light.

The patented Benninghoff process for producing both heat and light is based upon a proper mixture of oxygen and gas through mechanical arrangement, by pressure, producing, it is also claimed, "perfect flameless combustion," thereby imparting oxygen as a supporter of combustion. The fuel requires no coal, coke or other admixture for welding or metalurgy. This process does not burn or destroy the fibre or material, but improves the quality of the iron or steel coming from it. No smoke-stack or chimney is required, as it needs no draft. There is no expense in hauling material for combustion nor for the taking away of ashes. The cost of the furnace is but one-seventh that of most furnaces required to produce and maintain an equal degree of heat.

The light produced by this company is of two kinds—one by which a platinum wire gauze is heated to the point of incandescence; the other is that made by combustion, like burning coal gas. The first is called the Benninghoff Incandescent

cent Sun Light, with which no shade nor globe is used, and which is unaffected by wind or rain. The indirect process on exhibition gives a beautiful white flame of great power for light. The combined air and gas for this is conveyed through the same pipe to produce this light and heat for dwelling houses.

The gas just before entering the furnace receives the air, and by the patented process is thoroughly mixed with it. It is then lighted in the furnace by a piece of burning paper, and in a very little time there is a white, flameless ball of heat, in which the iron and steel are placed. In these exhibitions a piece of Bessemer steel, about 5 ft. long and $\frac{3}{4}$ x $\frac{1}{4}$ in. thick, was thrust into the "perfect combustion" and soon heated hot enough to be forged. A big chunk of railroad iron four or five feet long was then placed into the burning mass, the furnace door being open much of the time, and was melted in twenty minutes.

A Remarkable Drainage Enterprise.

The Russian government is engaged in one of the most extensive drainage enterprises ever undertaken in any portion of the world. The location is what is known as the Pinsk Marshes, in the southwest of Russia, near the borders of Galicia. This region is so extensive as to secure special designation in the ordinary map of Europe, and in point of area, is very much larger than Ireland. The marshes have become famous in Russian history as a refuge of all manner of romantic characters, and have remained an inreclaimable wilderness up to within the last two or three years.

In 1870 the Russian Government first took in hand seriously the abolition of this wild expanse, owing to its being perpetually more or less submerged and covered with a jungle growth of forest, preventing not only communications between the Russian districts on either side, but also between Russia and Austro-Germany. A large staff of engineering officers and several thousand troops were drafted into the region, and these have been engaged upon the undertaking since. Up to the present time about 4,000,000 acres have been reclaimed by means of the construction of several thousand miles of ditches and canals, so broad as to be navigable for barges of several hundred tons burden. Just now the engineers are drawing up the programme for next year, which comprises the drainage of 350,000 acres by means of the construction of 120 miles more of ditches and canals.

Of the 4,000,000 acres already reclaimed, 600,000 acres consisted of sheer bog, which has been converted into good meadow land; 900,000 acres of "forest tangle," which have been prepared for timber purposes by cutting down the underwood and thinning the trees; 500,000 acres of good forest land—forest oases in the middle of marshes—hitherto inaccessible, but which have been connected more or less by navigable canals, and thereby with the distant markets; and finally, 2,000,000 acres have been thrown open to cultivation, 120,000 acres of which have already been actually occupied. Besides making the canals and ditches, the engineers have built 179 bridges, bored 577 wells from 20 ft. to 80 ft. deep, and have made a survey of 20,000 square miles of country hitherto unmaped. When the task is finished Russia will have effaced from the map of Europe one of the oldest and toughest bits of savage nature on the continent. From an engineering, geological, and scientific point of view generally the work is one of special interest.—*Mechanical World*.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Delaware, Lackawanna & Western, annual meeting, at the office in New York, Feb. 21.

Missouri Pacific, annual meeting, at the office in St. Louis, March 8.

Peoria, Decatur & Evansville, annual meeting at the office in Peoria, Ill., March 1.

Rochester & Ontario Belt, annual meeting, at the office, New York, Feb. 15.

Brunswick & Western, annual meeting, at the office in Brunswick, Ga., March 9.

Atlanta & Charlotte Air Line, meeting, at the office, New York, March 9.

St. Louis, Iron Mountain & Southern, annual meeting, at the office in St. Louis, Mo., March 8.

New Orleans & Northeastern, annual meeting, at the office in New Orleans, La., March 7.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Atchison, Topeka & Santa Fe, \$1.50 per share, quarterly, payable Feb. 15.

Canada Southern, $1\frac{1}{2}$ per cent., payable Feb. 15.

Chicago & West Michigan, $1\frac{1}{2}$ per cent., semi-annual, payable Feb. 15. The August dividend was 1 per cent.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *National Association of General Passenger and Ticket Agents* will hold its half-yearly convention in Washington, on Tuesday, March 15.

The *General Time Convention* will hold its spring meeting in New York City, on Wednesday, April 13.

The *Car Accountants' Association* will hold its annual convention in Atlanta, Ga., beginning on Tuesday, April 19.

The *Master Car-Builders' Club* holds its regular meetings at the rooms, No. 113 Liberty street, New York, on the third Thursday in each month.

The *New England Railroad Club* holds its regular meetings at its rooms in Boston & Albany passenger station in Boston, on the second Wednesday of each month.

The *Western Railway Club* holds its regular meetings at its rooms in Chicago on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 15 Washington street, Chicago, at 7:30 p. m., on the first Tuesday of each month.

Meeting of the American Society of Civil Engineers.

The monthly business meeting of the American Society of Civil Engineers was held at the Society's house at 2 o'clock on Wednesday, the 8d of February, President Worthen in the chair, and after the transaction of the routine business discussions on Mr. E. B. Dorsey's paper on Irrigation and on Mr. J. M. Wilson's specifications for iron bridges were read. The following candidates for membership were declared elected as members of the Society:

David Frederic Maxwell, Chief Engineer Government Railways, Province of New Brunswick, Canada, St. Stephen, N. B., Canada.

Silvanus Miller, Jr., Hatfield, Mass.

George Sullivan Morrill, Chief Engineer Old Colony R. R., Boston, Mass.

George Frederick Simpson, New York City.

John Thompson, Engineer Consolidated Telegraph and Electrical Subway Company of New York, New York City.

And the following as Juniors:

George Herbert Leiland, C. E., Providence, R. I.

John Muirhead Stewart, Dobbs Ferry, N. Y.

Arthur Smith Tuttle, Brooklyn, N. Y.

Schuyler Skaats Wheeler, Superintendent "C. & C." Electric Motor Company, New York City.

Some verbal discussion then followed on the bridge specifications, and an entertaining description by the President of the peculiar method of making double track bridges out of single track Howe trusses at the time when the second track was laid on the Boston & Albany. This consisted in moving the trusses apart, putting A-trusses across over head, from which a girder under the floor beams was carried by rods.

This method did not meet the approval of Mr. Jas. Laurie, who was called upon by the Massachusetts commission to inspect these structures, with the general understanding that the railroad company would pay him.

He was in a great hurry to get in his report, because, he said, he was afraid the bridges would tumble down before he reported. The result of his unfavorable report was to irritate the president of the railroad company so much that he refused to pay the bill, which the railroad commission finally had to pay itself.

The society then adjourned to the usual collation provided by the subscriptions of resident members.

Transportation in Congress.

The bill reported to the United States Senate authorizing an investigation of the books, accounts and methods of the Pacific railroads, gives power to the President to appoint three commissioners at \$750 a month each. Section No. 2 makes it the duty of the commission to examine into the workings and financial management of all the Pacific railroads that have received aid from the government in bonds, to see whether their obligations to the government have been complied with; whether the books and accounts have been kept so as to show their net earnings; whether there has been a diversion of earnings through constructive mileage allowances or for improper purposes; whether there has been discrimination of rates; whether any and how much money is due the United States on account of erroneous accounts or settlements made by said roads.

The commissioners are directed to ascertain and report the names of all stockholders in each of the companies, from its organization down; the salaries (over \$5,000) now or at any time paid to officers; the names of the persons who have received bonuses or donations, and all payments made under the head of legal expenses. The commissioners are required to consider and report whether the interests of the United States require any extension of the time for the performance of the obligations of the companies, and what further security it is expedient that the companies should give. The commission is armed with full power to command the attendance of witnesses and the production of books and papers. One hundred thousand dollars are appropriated for the purposes of the investigation. Whenever, in the opinion of the President, it is deemed necessary to the protection of the interests of the Government, the Secretary of the Treasury shall clear off the paramount lien, mortgage, or other encumbrance, and it is made the duty of the Attorney-General to take the necessary proceedings in the courts for such redemption, and to foreclose any mortgages or liens of the United States in respect of such railroad property.

Section No. 5 provides that from and after July 1, 1887, there shall be charged to the Central Pacific, Union Pacific, the Central branch of the Union Pacific, the Sioux City and Pacific and the Kansas Pacific railway companies 40 per cent. of the net earnings in place of the 25 per cent. provided for in the act of May 7, 1878, "so far as the same respects the companies mentioned in said act, and as to the others herein mentioned absolutely," and to that end the act of May 7 is extended to the Kansas Pacific, Sioux City and the Central branch of the Union Pacific.

The sixth and last section authorizes the investment of sinking funds in any of the Government bonds issued for the benefit of the roads or in their first mortgage bonds.

The Interstate Commerce bill has been signed by President Cleveland, and it will go into effect on April 5, 1887.

ELECTIONS AND APPOINTMENTS.

Alabama Railroad Commission.—The Governor of Alabama has appointed Major Henry R. Shorter President of the State Railroad Commission for the next two years, and Wiley C. Ruustall and F. W. Lawler Associate Commissioners for four years. It is the same commission that has served for two years past.

Allegheny Valley.—Mr. Spencer B. Rumsey is Superintendent of the Low Grade Division in place of Mr. A. A. Jackson, who has gone to the New York & New England road.

Americus, Preston & Lumpkin.—The officers of this company are S. H. Hawkins, President; J. N. Bass, General Superintendent; T. N. Hawkes, Secretary and Treasurer; C. B. Wilburn, General Agent. Offices at Americus, Ga.

Baltimore & Ohio.—Mr. J. Van Smith has been appointed General Agent at Baltimore and also Assistant Superintendent of the Eastern Division of the road.

Buffalo, New York & Philadelphia.—Mr. Hamilton Johnson has been appointed General Agent of the freight department of this road, with headquarters at Buffalo, N. Y.

Burton Stock Car Co.—The directors of this company are: John H. Fox, Jaffrey, N. H.; Hon. Edward Spaulding, M. D.; Nashua, N. H.; Edward F. Perkins, Boston; Josiah G. Graves, M. D., Scituate, Mass.; Murray V. Livingston, Boston; George D. Burton, New Ipswich, N. H.; Josiah T. Wilson, Boston; William S. Reed, Leominster, Mass.; Joseph C. Moore, Manchester, N. H. The officers are: John H. Fox, President; Geo. D. Burton, Secretary and Treasurer; Clarence Hale, Assistant Secretary; Edwin F. Perkins, Vice-President and General Manager.

Central of Georgia.—Mr. H. B. Hollins, of New York, has been chosen First Vice-President of this company.

Central Iowa.—Mr. William W. Raibe has been appointed General Agent of this road at Peoria, Ill., vice R. S. Marten, resigned.

Chicago, Lake Geneva & Pacific.—The directors elected the following officers at a meeting held in Milwaukee, Wis., last week: John E. Burton, Lake Geneva, President; William H. Conger, Elkhorn, Wis., Vice-President; G. W. Esterly, Whitewater, Wis., Second Vice-President, and John A. Kennedy, Milwaukee, Secretary and Treasurer.

Chicago, Oquawka & Kansas City.—The board of directors of this proposed Illinois road have elected the following officers: President, John S. Thompson, Chicago; Vice-President, James Harlan, Mt. Pleasant, Iowa; Secretary and Treasurer, V. M. Blandina, Rock Island, Ill.

Cincinnati, Hamilton & Dayton.—Mr. Dennis Leary has been appointed General Baggage Agent and Depot Master of this road at Cincinnati, O.

Denison, Bonham & New Orleans.—Captain S. B. Allen, of Bonham, Tex., has been elected President of this company.

East Tennessee, Virginia & Georgia.—The following have been elected directors of this company: Alfred Sully, Thomas M. Logan, John H. Inman, George F. Stone, Emanuel Lehman, Isaac L. Rice, J. A. Rutherford, James B. Pace and George S. Scott.

Fitchburg.—But few new appointments will be made on the Troy & Greenfield, which road will be known as the Tunnel Division of the Fitchburg. J. F. Adams has been appointed Division Superintendent of the line. Geo. E. Dudley will remain as Station Agent with sole charge of the business. Walter J. Lemoine is his private clerk.

Georgia Pacific.—Mr. I. Y. Sage, formerly General Superintendent and Engineer, is now General Manager and Engineer.

Great Eastern.—At the annual meeting in Montreal, the following directors were elected: Hon. J. Armstrong, Hon. F. X. O. Methot, Messrs. A. F. Chaffee, James Cooper, John Rankin, F. Vanasse, and L. G. J. Fosbrooke.

Hillsboro Branch.—The incorporators of this proposed Wisconsin road are Thomas Shea and Albert Field, of Hillsboro, Wis., and W. S. Field, of Virque, Wis.

Indianapolis Car Works.—Mr. Charles E. Gore, late Superintendent of the Lafayette Water Works, has been made General Manager.

Jacksonville, Tampa & Key West.—Mr. R. Moran, previously General Superintendent and General Freight and Passenger Agent, is now General Superintendent and General Passenger Agent; L. C. Deming, previously Assistant Secretary and Assistant General Passenger Agent, is now Assistant Secretary and General Ticket Agent; L. E. Barker, previously Assistant General Freight Agent, is now General Freight Agent. Reports of mileage for car service and car tracers should be addressed to L. E. Spencer, Car Accountant. Remittances for balances should be made to and drafts drawn on E. B. Powell, Auditor.

Lake Erie & Western.—The following circular from George L. Bradbury, General Manager for Samuel Thomas, Purchaser, is dated Bloomington, Ill., Feb. 1: "The following officers are hereby appointed, and will at once assume the duties of their respective positions: D. S. Hill, General Superintendent; A. J. Castator, Auditor; A. D. Thomas, Treasurer; W. S. Weed, General Freight Agent; G. W. Smith, General Passenger Agent; T. H. Perry, Chief Engineer and Purchasing Agent; General offices at Bloomington, Ill., as heretofore; H. L. Cooper, Superintendent of Equipment, Lima, O.

"All agents and employes are continued in their several positions. Agents will remit to the National State Bank, of Bloomington, Ill., and send duplicate remittance slips to A. D. Thomas, Treasurer."

Lake Shore & Michigan Southern.—Major A. J. Smith, now General Passenger Agent of the Cleveland, Columbus, Cincinnati & Indianapolis, has been made General Passenger and Ticket Agent of the above line. E. C. Luce, present General Ticket Agent, will act as Assistant to Major Smith.

Mr. O. D. Richard has been appointed Engineer of the Lake Shore Division of this road in place of L. C. Brewer, resigned.

Mexican Central.—Mr. M. H. King, formerly Assistant General Passenger Agent of the Michigan Central, has been appointed Commercial Agent of this road.

Michigan Central.—Mr. James Chubb has been appointed Superintendent of the air brakes, and General Inspector of the entire line from Chicago to Buffalo.

Charles A. Carscaddon, heretofore Private Secretary of President Ledyard, has been appointed Traveling Passenger Agent.

Mississippi Valley.—At a meeting held in Vidalia, La., Jan. 20, the following directors were chosen: Samuel Block, Henry Frank, Isaac Friedler, Henry A. Garrett, Rufus F. Learned, Isaac Lowenberg, John Rawle, John Smyth, Hiram R. Steele. The board elected Hiram R. Steele President; Rufus Learned, Vice-President; John Rawle, Secretary; Henry Frank, Treasurer.

Newburg, Dutchess & Connecticut.—At the annual meeting in Newburg, Conn., the following were chosen directors: John S. Schultz, W. R. Schultz, W. S. Eno, W. N. Sayre, R. H. Coffin, Albert Emans, George Potter, C. L. Kimball, Oliver Davidson, N. P. Plass, R. C. Van Wyck, H. B. Willis, S. F. Wright. The officers are: John A. Schultz, President and Treasurer; William R. Wells, Secretary; C. L. Kimball, Superintendent and General Freight Agent.

New York Central & Hudson River.—Mr. Henry Monett has been appointed General Passenger Agent in place of D. M. Kendrick, deceased. Mr. Monett was for a number of years with the Pennsylvania Co. and came to the West Shore road as General Passenger Agent when that line was opened. When the West Shore was leased to the New York Central he was continued in the same position.

New York, Lake Erie & Western.—Mr. S. Cole has resigned the position of Ticket Agent on the West Shore at East Utica, N. Y., to become Superintendent of Telegraph for the above company.

Mr. John W. Cloud will succeed R. H. Soule as General Manager of this road.

New York, Pennsylvania & Ohio.—Mr. S. F. Randall has been appointed General Yardmaster, vice Mr. D. C. Bachelor, resigned, with control of the yards in the Iron district, Ohio, extending 4 miles from Youngstown, O., to Sharpville.

Old Colony.—Mr. George Connor has been appointed General Passenger and Ticket Agent of this road, which position he will fill in addition to that of Passenger Agent of the Fall River line of steamers. His headquarters will be at Boston.

Ontario & Quebec.—At the annual meeting of this company's shareholders, held in Montreal last week, the following directors were re-elected: Sir George Stephen, Messrs. W. C. Van Horne, E. B. Osler, R. B. Angus and Sir Donald A. Smith. The officers re-elected were: Mr. E. B. Osler, President; W. C. Van Horne, Vice President; C. Drinkwater, Secretary and Treasurer.

Oregon Railway & Navigation.—Mr. T. J. Peabody has been appointed Agent at Lewiston, Oregon, vice Mr. F. F. Root, who has been transferred to Riparia.

Parsons & Pacific.—The present list of officers of this company is as follows: R. S. Stevens, President; C. H. Kimball, Vice-President; T. Penfield, General Manager; Lee Clark, Secretary and Treasurer; H. D. M'rick, General Eastern Agent; D. W. C. Perry, Chief Engineer.

Pennsylvania.—Mr. R. E. Boyd has been appointed Acting Passenger Agent of this road for the Baltimore district, vice Mr. De Haven.

Perry County.—The board of directors of this new company in Pennsylvania is made up as follows: Frank Mortimer, B. F. Jenkin, Chas. A. Barnett, John A. Magee, John W. Shetley, Wm. Grier, Jas. W. Shull, M. B. Strickler, H.

R. Johnston, Silas W. Conn, John Adams and R. S. Minch. The officers are: President, Frank Mortimer; Treasurer, W. A. Sponsler; Secretary, E. R. Sponsler.

Prescott & Arizona Central.—Mr. Oscar Vanderbilt, formerly Passenger Agent of the Northern Pacific, has been appointed General Passenger Agent of this road.

Richmond & Danville.—The following circular from V. E. McBee, Superintendent Western North Carolina Division, is dated Asheville, N. C., Feb. 1: "Mr. R. B. Bridges, Jr., is appointed Engineer of Maintenance of Way of this division, and, under the direction of the Superintendent, will have charge of the Roadway Department in all its branches, including water supply, road supervisors, tunnel and bridge foremen, and all foremen of special forces engaged in the maintenance or repairs of roadway and structures will report to him and be governed by his instructions. Pay rolls of the force under his charge and vouchers for materials used in maintenance and repairs will be certified by him to the Superintendent for his certificate and transmission through regular channels."

Mr. L. L. McCleskey has been appointed Division Freight and Passenger Agent for the Atlanta & Charlotte Air-Line Division of this road. The office of Assistant General Passenger Agent has been abolished.

Ripley & Mill Creek Valley.—The board of directors of the West Virginia Company consists of T. Greer, A. F. Parsons, D. K. Hood, J. H. Riley, J. S. McKown, H. B. Creel, Geo. B. Crow, Isaac Sayre, Hiram Douglas, B. F. Armstrong, James M. Poling, H. C. Fleisher, E. A. Thomas. The officers are: W. T. Greer, President; A. F. Parsons, Vice-President; D. K. Hood, Treasurer; J. S. McKown, Secretary; A. J. Vosburgh, Chief Engineer.

Rome, Watertown & Ogdensburg.—Mr. Frederick Neff, Chief Clerk of this road at Suspension Bridge, has been promoted to the position of Agent at that point, succeeding Mr. Geo. G. Chauncey, resigned.

St. Louis, Arkansas & Texas.—John J. Rogers has been appointed Assistant General Freight Agent at St. Louis. J. W. Allen has been appointed General Agent at Memphis, Tenn., to succeed Mr. Rogers. L. F. Day has been made Assistant General Freight Agent at Texarkana, Tex.

Schuylkill Navigation Co.—At the annual meeting in Philadelphia this week the following officers were elected: President, Frederick Fraley; Directors, John N. Hutchinson, Charles W. Wharton, George Brooke, Thomas R. Patton, John B. Love, Samuel Gastine Thompson; Treasurer, Richard Wilkins; Secretary, Frederick F. Halliwell.

South Atlantic & Ohio.—The officers of this company are as follows: H. C. Wood, President; John M. Bailey, General Manager; John L. Wellington, Superintendent; J. Wilder, General Freight Agent; Geo. A. Blackmore, General Ticket Agent. General offices, Bristol, Tenn.

South Florida.—Mr. Wilbur McCoy has been appointed Auditor and General Freight and Ticket Agent of this line, with headquarters at Sanford, Fla.

Southwestern Passenger Association.—Mr. J. La Barre has been appointed Rate Clerk of this association.

Vincennes & New Albany.—The new directors of this proposed road, which will run from Vincennes to New Albany, Ind., are: Nathan F. Dalton, Edward W. Watson, John Hack, W. B. Chadwick, Vincennes, Ind.; Nathan P. Hobart, E. F. Fuller, New York; Emil Walmann, Greenfield, Ill.; George Friedman, Jasper, Ind.; Charles McCarrell, Hill Ham, A. Stout, Paoli, Ind.; D. E. McIntosh, Hardensburg, Ind.; Marion V. Stull, Greenville, Ind.; George W. Dewese, Fredericksburg, Ind. This board has elected the following officers: President, Edward W. Watson; Vice-President, George Friedman; Secretary, N. F. Dalton; Attorney, Charles F. Berrian; Engineer, N. P. Hobart.

Wabash, St. Louis & Pacific.—Receiver Cooley has appointed Mr. William Orr Commercial Agent of this line at Chicago.

Wheeling & Lake Erie.—The following board of directors has been elected: George J. Forrest, New York; D. E. Garrison, St. Louis; Melville C. Day, New York; John G. Warwick, Massillon; and M. D. Woodford, G. W. Davis and S. C. Reynolds, of Toledo. These have elected the following officers: President, George J. Forrest; Vice-President, D. E. Garrison; General Manager, M. D. Woodford.

PERSONAL.

—Abraham Gould, a brother of Jay Gould, is Supply Agent of the Missouri Pacific at St. Louis, Mo.

—Mr. George A. Ricker, for many years principal Assistant Engineer on the west end of the New York, Lake Erie & Western, and recently Topographer with W. A. Haven on the Northern Pacific in Montana, has resigned his position to open an office in Buffalo, N. Y., where he will carry on a general engineering and architectural business.

—Hon. William B. Hayward, ex-Mayor of Bangor, Me., has just died of heart disease in that city. He was President of the Bangor & Piscataqua and the Green Mountain Railroad, besides being President of the Kennebec National Bank, a trustee of the Bangor Savings Bank and a large land owner and lumber operator in Maine and New Brunswick. He was 59 years old.

TRAFFIC AND EARNINGS.

Coal.

Anthracite coal tonnages for the month ending Jan. 29, as given by the weekly reports of the companies were, this year, 1,928,676; last year, 2,316,587; decrease, 837,861 tons, or 16.7 per cent. Part of the decrease has been due to the strike and the difficulty of delivering coal at tidewater; this difficulty is now almost removed, as there is a full force of new men at work at nearly all the shipping points.

Bituminous coal tonnages for the month to Jan. 29 are reported as follows:

	1887.	1886.	Inc. or Dec.	P. c.
Cumberland.....	184,167	158,013	I. 26,154	16.5
Broad Top.....	20,082	20,082	I. 13,878	69.3
Barclay.....	13,174	13,181	D. 7	—
Beech Creek.....	85,648	75,346	I. 10,302	13.7
Pennsylvania R. R.:—				
Clearfield.....	235,808	208,863	I. 26,945	12.9
Mountain District.....	62,176	42,418	I. 19,758	47.0
Penn and Westmore.....	123,965	100,311	I. 23,654	23.5
Minor districts.....	125,679	81,188	I. 44,488	54.8
Chesapeake & Ohio.....	111,105	83,300	I. 27,805	33.5
Norfolk & Western.....	85,095	67,928	I. 17,167	25.7
Total.....	1,080,774	850,348	I. 210,426	24.7

All the lines show large increases with one exception.

Coal tonnages for the month to Jan. 29 are reported as follows:

	1887.	1886.	Inc. or Dec.	P. c.
Southwest Penna. R. R.....	254,022	152,170	I. 101,852	67.0
Other districts, Pa. R. R.....	89,084	63,157	I. 25,927	41.1
Connellsville, via Pa. R. R.....	7,841	3,162	I. 4,679	148.4
Total.....	351,547	218,489	I. 133,058	61.0

All these tonnages are over the Pennsylvania Railroad, which is the only line reporting coke tonnages regularly.

Anthracite coal tonnage passing over the Belvidere Division, Pennsylvania Railroad, in January was:

	1887.	1886.	Inc. or Dec.	P. c.
S. Amboy for shipment.....	4,749	41,734	D. 36,985	88.7
Local points on N. J. divs.....	93,004	70,015	I. 22,989	31.7
Co.'s use.....	17,707	21,670	D. 3,963	18.0
Total.....	115,520	133,419	D. 17,899	13.8

Of the total this year 97,580 tons were from the Lehigh Region and 17,940 tons from the Wyoming Region.

Actual tonnage passing over the Pennsylvania and New York road for the two months of the fiscal year from Dec. 1 to Jan. 29 was:

	1886-87.	1885-86.	Increase.	P. c.
Anthracite.....	208,290	208,127	32,163	12.0
Bituminous.....	29,414	29,039	375	1.3
Total.....	327,704	298,166	32,538	11.0

The greater part of the anthracite comes from the Lehigh Valley road, of which this line is an extension.

Cumberland coal shipments for the week ending Feb. 5 were 45,657 tons. Total to Feb. 5 this year, 229,824; last year, 195,975; increase, 33,849 tons, or 17.3 per cent.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

Month of January:	1887.	1886.	Inc. or Dec.	P. c.
Buff., Roch. & P.....	\$122,014	\$117,115	I. 4,899	4.2
Calo. V. & C.....	36,000	35,478	I. 522	1.5
Canadian Pac.....	618,000	500,558	I. 117,442	23.5
Central Iowa.....	100,013	80,420	I. 19,594	24.4
Chicago & Atl.....	138,106	106,398	I. 31,708	29.9
Chi. & East. Ill.....	155,960	135,883	I. 20,077	14.7
Chi., Mil. & St. P.....	1,491,000	1,445,174	I. 45,826	3.2
Cin., H. & Day.....	229,553	200,669	I. 28,884	14.4
C. I. St. L. & C.....	220,955	195,995	I. 24,960	12.7
Det., Lan. & No.....	70,263	65,770	I. 4,493	6.9
Ev. & T. Haute.....	58,000	51,177	I. 6,823	13.4
Ft. Worth & D.....	37,345	26,644	I. 10,701	7.8
Ind., Dec. & Spr.....	40,983	35,120	I. 5,863	16.7
Lou., Kv. & St. L.....	64,219	56,574	I. 7,645	13.4
Lou., N. O. & T.....	200,400	159,748	I. 40,652	25.4
Manhattan.....	653,617	581,573	I. 72,074	12.4
Mexican Central.....	417,000	338,875	I. 78,125	23.1
Mil. & Northern.....	60,764	40,028	I. 20,736	51.7
Mobile & Ohio.....	236,015	184,253	I. 51,752	28.1
Norfolk & West.....	281,655	200,837	I. 80,798	30.2
Northern Pacific.....	542,375	480,330	I. 62,045	12.9
Ohio & Miss.....	291,112	274,180	I. 16,932	6.2
Peoria, Dec. & E.....	71,000	54,921	I. 16,079	30.3
St. Jo. & Gd. I.....	92,875	53,350	I. 39,516	74.5
St. L., Ark. & T.....	164,387	125,691	I. 38,696	30.7
Main Line.....	99,011	94,007	I. 5,004	6.0
Belleville Line.....	73,923	58,181	I. 15,742	26.8
St. Louis & San F.....	386,501	282,007	I. 104,494	30.7
St. P. & Duluth.....	108,686	57,172	I. 51,514	90.4
Tol. & Ohio Cen.....	81,133	52,002	I. 29,131	56.0
Wisconsin Cent.....	126,130	95,171	I. 30,959	32.6

Year to Dec. 31:	1886.	1885.	Inc. or Dec.	P. c.
Buff., N. Y. & P.....	\$2,568,784	\$2,416,228	I. \$152,556	6.4
Net earnings.....	411,271	610,871	D. 199,600	32.7
Bur., C. R. & No.....	2,933,300	3,093,514	D. 160,205	5.2
Net earnings.....	800,906	903,972	D. 103,066	11.4
Canadian Pac.....	10,981,902	8,367,218	I. 2,614,684	30.5
Net earnings.....	3,725,317	3,478,268	I. 247,049	7.1
Chi., Bur. & Q.....	20,728,408	26,556,425	D. 15,728,017	74.8
Net earnings.....	13,081,742	12,841,297	I. 240,445	1.9
Chi. & W. Mich.....	1,395,980	1,297,301	I. 98,679	7.6
Net earnings.....	370,482	348,788	I. 21,694	6.2
Den. & R. G. W.....	1,051,900	1,021,080	I. 30,811	3.0
Net earnings.....	347,798	307,500	I. 40,298	13.1
Ft. Worth & D.....	445,422	462,027	D. 16,605	3.9
Net earnings.....	204,831	191,567	I. 13,264	6.9
Gr. Rap. & Ind.....	2,078,500	1,946,143	I. 132,356	6.8
Net earnings.....	748,822	603,715	I. 145,107	23.7
Hous. & Tex. C.....	3,080,796	2,681,520	I. 399,276	14.9
Net earnings.....	789,579	629,143	I. 160,436	22.3
K. C., Ft. S. & G.....	2,539,338	2,546,526	D. 7,188	0.3
Net earnings.....	1,061,811	988,219	I. 73,592	7.8
Louis. & Nash.....	3,493,056	13,670,774	D. 10,177,718	29.3
Net earnings.....	8,517,824	5,330,922	I. 3,186,902	59.8
L. N. O. & Tex.....	1,803,785	1,387,237	I. 416,548	30.0
Net earnings.....	551,222	354,010	I. 197,212	55.7
Mil., L. S. & W.....	2,317,905	1,365,278	I. 952,627	69.8
Net earnings.....	979,045	420,890	I. 558,155	132.6
Northern Pacific.....	12,320,552	11,349,899	I. 970,653	8.6
Net earnings.....	6,140,372	5,661,782	I. 478,590	8.4
Ohio & Miss.....	3,827,832	3,679,815	I. 148,017	4.0
Net earnings.....	1,150,108	1,034,969	I. 115,139	11.1
St. Jo. & Gd. I.....	1,169,125	1,097,028	I. 72,097	6.6
Net earnings.....	506,962	368,695	I. 140,267	38.2

Month of December.				
Buff., N. Y. & P.	\$194,702	\$204,517	D.	\$9,815
Net earnings	2,890	38,317	D.	35,427
Bur., C. R. & No.	306,719	286,909	I.	19,810
Net earnings	96,681	48,347	I.	48,334
Canadian Pac.	604,100	729,935	I.	124,835
Net earnings	280,245	241,033	I.	39,212
Cen. of Georgia.	430,982	174,272	I.	256,710
Net earnings	213,916	177,272	I.	36,644
Chi., Bur. & Q.	2,368,431	2,329,975	I.	38,456
Net earnings	1,227,360	1,317,862	D.	90,473
Ft. Worth & D.	46,251	33,561	I.	12,690
Net earnings	23,848	6,392	I.	17,446
Houston & T. C.	372,133	336,051	I.	36,082
Net earnings	140,952	50,595	I.	90,357
Lowell & Wash.	174,122	1,164,212	I.	990,090
Net earnings	528,873	473,515	I.	55,358
Lou., N. O. & T.	272,376	540,646	I.	268,270
Net earnings	134,760	109,643	I.	25,117
Northern Pacific.	699,663	775,371	I.	75,708
Net earnings	383,708	306,551	I.	77,157
Ohio & Miss.	206,918	312,904	D.	105,986
Net earnings	80,405	95,117	D.	14,712
Phila. & Reading.	1,576,776	1,678,777	D.	102,001
Net earnings	698,292	738,727	D.	40,435
St. Jo. & Gd. L.	108,973	102,320	I.	6,653
Net earnings	38,391	49,952	D.	11,561

explained by Senator Cullom in the Senate debate thereon, and this association will co-operate with the Commissioners under the Interstate Commerce law in securing, as far as possible, the benefits of that bill and in the faithful observance of all its provisions.

Resolved. That this committee meet with the Trunk Line Executive Committee on the call of the latter, and that a joint executive committee so constituted for the purpose proceed to such further agreement and recommendations of detail as may be required by the interpretation of the act agreed upon by such executive committee, and then submit the same to a meeting of the association for its final action.

Thus it is left for a future meeting of the association to determine what shape the organization is to assume.

Cotton.

Cotton movement for the week ending Feb. 4 is reported as follows, in bales:

Interior markets:	1887.	1886.	Inc. or Dec.	P. c.
Receipts.....	63,063	55,821	I. 7,242	12.9
Shipments.....	77,812	63,150	I. 14,662	23.2
Stock, Feb. 4.....	336,612	409,013	D. 132,401	28.2

Seaports:	1887.	1886.	Inc. or Dec.	P. c.
Receipts.....	130,753	122,418	I. 8,335	6.8
Exports.....	131,037	103,120	I. 27,917	27.1
Stock, Feb. 4.....	922,643	1,063,680	D. 141,037	13.2

The total movement from plantations for the crop year to Feb. 4 is estimated at 5,552,154 bales, against 5,412,026 last year, 5,057,830 in 1884-85, and 4,920,787 in 1883-84.

The *Commercial and Financial Chronicle*, in its review of the cotton movement for the season, says: "As it will interest the reader to see what has come into sight each month of the season during this and previous years, we have prepared the following, which shows the movement for the last four seasons:

Months.	1886-87.	1885-86.	1884-85.	1883-84.
September.....	434,838	485,552	413,836	450,047
October.....	1,332,901	1,360,870	1,369,111	1,325,716
November.....	1,579,539	1,449,433	1,390,902	1,317,773
December.....	1,467,767	1,488,582	1,360,404	1,264,816
January.....	692,654	541,793	513,187	453,985

Total 5 months..... 5,477,699 5,320,230 4,987,440 4,812,337

"The movement up to Feb. 1 shows a decrease in the average weight as compared with the same period of last year, the average this year being 488.46 lbs. per bale, against 489.36 per bale for the same time in 1885 and 480.23 lbs. in 1884."

Trunk Line Executive Committee.

The Trunk Line Executive Committee restored the West-bound rates from Boston and Philadelphia at a meeting held in New York this week. They had been cut to meet an alleged cut in sugar rates by New York roads.

Buffalo Freight Committee.

This committee has arranged an increase in rates on coal, salt and cement, as follows: The coal rate has been advanced to a basis of \$2.50 per gross ton to Chicago, an increase of 50 cents. Salt and cement were advanced from 20 to 30 cents per barrel.

Trunk Line Presidents.

The Trunk Line Presidents' Committee met in New York Feb. 3. Resolutions were adopted pledging the Trunk Lines and their affiliated connections to the absolute maintenance of live stock and dressed meat tariffs from Feb. 7. A similar resolution was adopted concerning the maintenance of tariff rates on east-bound dead freight. It was also agreed that a hearing should be had at an early date in relation to the Grand Trunk Railway's application for a revision of east-bound dead freight percentages. The requirements of the Interstate Commerce bill were also under consideration; and it was decided to refer the subject to the Trunk Line Executive Committee, who will report their recommendations and conclusions to the Presidents' Committee. After the railroad commission provided for by the bill has been appointed, its official interpretation of the provisions of the new law will probably be requested, in order that the railroads may be able to strictly conform therewith.

Central Traffic Association, Passenger Department.

A meeting of the passenger agents of the different roads in this association was held on Feb. 9 in Chicago, and the operation of the Interstate Commerce law relating to passenger traffic was discussed at some length, but the complex questions of the bill and its length will necessitate more consideration and further meetings. No definite result was arrived at at this meeting.

OLD AND NEW ROADS.

Atchison, Topeka & Santa Fe.—The directors will soon settle upon the entrance of their new line into Chicago. They have two offers, one from the Great Western Terminal Co., controlled by the Wisconsin Central, and the other from the Chicago & Eastern Illinois, representing the Western Indiana, which has fine terminal facilities, occupied jointly by the Chicago & Eastern Illinois, the Wabash, St. Louis & Pacific and the Chicago & Grand Trunk. The matter has been referred to the Finance Committee with power, and they will act at once.

The earnings of the road in January show an increase of \$424,000 over the corresponding month of last year.

Messrs. Sooy Smith & Co., of New York and Chicago, are just commencing work on the bridge over the Missouri, at Sibley, 30 miles below Kansas City, for the Chicago extension of this road. The bridge will have 8 piers, 5 of them being pneumatic caissons sent to the bed rock.

Atlantic & Pacific.—A Boston dispatch of Feb. 3 says: "This company's officers have for a long time declined to give to the public or the press the statements of earnings or expenses, as is customary with other railroad corporations. It is usual, therefore, to rely upon approximate earnings in getting at the business of this company, but the following figures, giving the passenger traffic of the road, are from official sources:

	1886.	1885.	Increase.
East-bound.....	13,859	7,669	6,190
West-bound.....	33,738	7,747	26,011
Total.....	47,607	15,416	32,191

"In other words, the passenger traffic of the Atlantic & Pacific for the last year showed a gain of upward of 200 per cent. over the previous year. Much of this was the result, probably, of the passenger rate war in the West."

Col. W. A. Bissell, General Passenger Agent, has made arrangements with the Arizona Central in Arizona, Terr., for the use of the latter road, which runs through the big Chino Valley and is 74 miles long. Col. Bissell reports a railroad enterprise looking to the building of a road from Flagstaff to Globe, Arizona, to open up the mineral belt in that section. It is probable that 15 miles of this road will be constructed during the present year.

Baltimore & Ohio.—This company will build a new passenger station in Pittsburgh, Pa., beginning work on it as soon as spring opens. It will cost several hundred thousand dollars.

Bellingham Bay Railway & Navigation Co.—This company has filed articles of incorporation at Seattle, Washington Terr. It is proposed to construct a railroad and telegraph line from Whatcom to a connection with the Puget Sound Shore road, and any or all other roads now or hereafter to be constructed at or near Seattle. Capital stock \$1,000,000.

Boston & Albany.—This company will build a depot at Chatham, N. Y., at an expense of \$25,000.

Brooklyn Elevated.—The statement of this company for the quarter ending Dec. 31, 1886, shows: Gross earnings, \$153,789; operating expenses, \$100,257; other income, \$241; charges, \$63,777; deficiency, \$9,004. The general balance sheet shows cash on hand \$32,467, and a deficiency in the profit and loss account of \$470,040.

This road is experimenting with an automatic device for displaying in the cars the name of each station just before the train reaches it.

Buffalo, New York & Philadelphia.—Judge Corlett, of Buffalo, N. Y., has directed a decree of foreclosure, with costs, in the \$9,000,000 foreclosure suit of Henry D. Martin and Franklin D. Locke, as trustees, against this company. Members of the reorganization committee assert that this decision will bring about the reorganization of the property within 4 months.

Buffalo, Rochester & Pittsburgh.—The statement for the quarter ending Dec. 31 is as follows:

	1886.	1885.	Increase.	P. c.
Earnings.....	\$394,189	\$344,284	\$49,905	14.5
Expenses.....	274,128	241,492	32,726	13.5
Net earnings.....	\$120,061	\$102,892	\$17,169	16.7
Other income.....	25,192	—	25,192	—
Total.....	\$145,253	\$102,892	\$42,371	41.2
Charges.....	113,170	108,293	4,877	4.6
Surplus.....	\$32,083	\$5,351	\$26,732	—

* Deficit.

The coal trade on this line is reported as showing a large increase, but no figures are given.

Canadian Pacific.—This road is rapidly being extended over the northern wilderness of the state of Maine to a terminus in the lower provinces. Sixteen miles have already been built in the Moose River region after crossing the western boundary. Contracts will now be let for the building of the whole line to Mattawamkeag, and it is expected that the road will be completed to that point in one year and connection made with the Maine Central. Two years ago the Canadian Pacific obtained the right to bridge Moosehead Lake. Since then, the route having been found impracticable, permission is now asked of the Legislature to change the location to the foot of the lake. This will involve the necessity of crossing the Bangor & Piscataquis road at Greenville, Me., and building a parallel road as far as Brownville. The Canadian Pacific and Maine Central have ratified a contract by which the former will use the European & North American Division of the Maine Central between Mattawamkeag and Vanceboro, in order to connect with the New Brunswick system. During the coming summer extensive improvements are to be made on the entire 55 miles between these points, the expense of which will be borne equally by both companies. A bridge of 600 ft. in length will have to be built across the Kennebec River, and a longer one across the Penobscot at Mattawamkeag.

This company's statement of earnings and expenses for December and the year to Dec. 31 is as follows:

	Dec.	Year.
Earnings.....	\$894,100	\$10,081,804
Expenses.....	613,855	6,378,317
Net profits.....	\$280,245	\$3,703,487

"The gain in net profits over the same period last year is for December \$39,212; and from Jan. 1 to Dec. 31, \$478,270.

"The gross earnings for December include \$20,402 for the carriage of construction material, as against \$14,000 during the same month last year, but as it was carried at absolute cost, the net result is not affected.

This company's shops at Yale, B. C., were consumed by fire this week. Loss, \$100,000. The road is blockaded with snow, and telegraph lines are down.

Canastota, Watertown & St. Lawrence.—This company will probably build a new road extending from Canastota to Watertown, N. Y., and thence to the St. Lawrence River, touching at Clayton, Alexandria Bay and Morrisstown, and ending at Ogdensburg, N. Y. It is said that Mr. A. A. McLeod, President of the Elmira, Cortland & Northern, will be the President of the new company, and it is also stated that Mr. Austin Corbin is backing the enterprise. The town of Clayton has granted right of way, and one of its citizens has given 1,000 ft. frontage on the St. Lawrence River for docking purposes.

Cape Breton.—The Dominion Government has decided not to call for tenders for the construction of that portion of this road from Point Tupper to the Narrows until next summer. The contract that has been let to Sims & Slater is for the section between Sidney and the Narrows and is 45 miles in length. The work of constructing the proposed docks at Point Tupper will be undertaken next season.

Cape Fear & Yadkin Valley.—This road is now completed to Bellew's Creek, N. C., 5 miles northwest from the late terminus at Stokesdale, and 23 miles from Greensboro. Trains are running to the new terminus.

Carolina, Cumberland Gap & Chicago.—The lines of this road will start from Aiken, S. C. and Augusta, Ga., converging a short distance northwest of the two places, whence the road will run directly to Lexington, Ky. Its connection will be formed there with Cincinnati, Chicago and St. Louis. The length of the road will be 400 miles and some of the grading is already done. It will tap the coal and iron fields of North Carolina, Virginia and Georgia, and the Tennessee marble fields, as well as the cotton belt of the Carolinas.

Chesapeake, Ohio & Southwestern.—This company has applied to the New York Stock Exchange to list \$3,865,000 second mortgage 6 per cent. bonds covering 351 miles of road in operation between Elizabethport and Memphis, Tenn. The application says that the road has been leased to the Newport News & Mississippi Valley Co. for 50 years from Feb. 1, 1886. The lessee conducts the transportation business, collects revenues therefrom, pays the expenses of operation, taxes, the interest on its funded debt, and from the surplus, so far as it suffices, pays dividends up to 6 per cent. per annum to the stockholders.

Chicago & Atlantic.—An ancillary amended supplemental bill has been filed in Chicago in the foreclosure case of the Farmers' Loan & Trust Co., against this railroad company to foreclose a first mortgage of \$6,500,000. It is charged that the road is insolvent, that its revenues are diverted by its officers, and that the bondholders desire a foreclosure. The road runs from Marion, O., to Hammond, Ind.

Chicago, Burlington & Quincy.—This company has leased in perpetuity the free and full right of way over the tracks of the Wabash, St. Louis & Pacific from St. Peters, Mo., into St. Louis, including all tracks, switches and terminal facilities in the latter city, except certain freight houses. St. Peters is on the north side of the Missouri River, about 32 miles northwest from St. Louis, and on the road running from Moberly to St. Louis.

The statement for December and the year ending Dec. 31 is as follows:

	December.	1885.	1886.	Year.	1885.
Earnings.....	\$2,368,431	\$2,329,975	\$26,728,408	\$26,556,425	
Expenses.....	1,141,042	1,012,113	13,646,666	13,872,128	

Net earnings.....\$1,227,389 \$1,317,862 \$13,081,742 \$12,684,297

For the year the gross earnings increased \$171,983, or 0.6 per cent., and the expenses decreased \$225,462, or 1.6 per cent., leaving a gain of \$397,445, or 3.1 per cent., in the net earnings.

This company proposes to extend its line from Bogard Mound, Carroll County, Mo., to Kansas City, Mo., as soon as possible.

Chicago, Kalamazoo & Saginaw.—This company proposes to open direct communication between Toledo, O., and Kalamazoo, Mich., by building to a point near Richland, O., on the old Michigan & Ohio.

Chicago, Milwaukee & St. Paul.—A statement issued by this company says of the growth of this company's mileage: "At the end of 1875 its lines aggregated 1,400 miles of road in Illinois, Wisconsin, Iowa and Minnesota. In 1879 its first line entered Dakota, crossing the Sioux River near Canton. In June, 1882, the Council Bluffs Division was finished. During the 10 years ending Dec. 31, 1885, 3,532 miles of road had been constructed or purchased, the total mileage at that date being 4,931.3 miles. During 1886, the following extensions were built and opened for traffic: Glencoe, Minn., to Hutchinson, 13.8 miles; Andover, Dak., to Harlem, 55.6; Ellendale, Dak., to Edgeley, 26.5; Ipswich, Dak., to Bowdle, 30.5; Mitchell, Dak., to Scotland, 47.7; Tripp, Dak., to Armour, 20.0; Madison, Dak., to Lake Preston, 30.8; Sioux City, Ia., to Rodney, 37.2; Stultia, Ia., to Elkader, 4.8, and Calvary, Ill., to Evanston, 1.8, a total of 263.2 miles. There was also under construction, at the close of 1886 about 600 miles, all of which is to be completed in 1887.

"Total mileage in operation at the end of 1886 was 5,201.4, divided as follows: Illinois, 321; Wisconsin, 1,220; Iowa, 1,460; Minnesota, 1,130; Dakota, 1,070 miles."

The three pneumatic caissons of this company's new bridge over the Missouri at Kansas City, are now sunk, and to complete the piers ready for the superstructure there remains only to lay up the masonry above water. This has all been done since Nov. 1, 1886. Messrs. Scoy Smith & Co., of New York and Chicago, are the contractors for this bridge; Mr. D. Chanute is engineer.

Chicago, Oquawka & Kansas City.—This is to be constructed from Lacon, Marshall County, to Oquawka, Henderson County, Ill., through the counties of Henderson, Warren, Knox, Stark and Marshall to Kansas City, Mo.

Chicago, Rock Island & Pacific.—It is stated that this company will soon break ground in New Mexico, and build an extension of their line nearly parallel with the Atchison, Topeka & Santa Fe. The company has recently placed several blocks of stock amounting in all to \$5,000,000.

Chicago, Santa Fe & California.—This new branch of the Atchison, Topeka & Santa Fe will cross the Wabash, St. Louis & Pacific near Millard, Adair County, Mo., and enter Macon County about 3 miles west of La Plata, going southwest, passing through Mercerville and crossing the Hannibal & St. Joseph road at Bucklin, Linn County, Mo.

Cincinnati, Hamilton & Dayton.—A decision has been rendered in Cincinnati dissolving an injunction restraining the Emery Brothers, of this city, from attaching the property of this company found in New York state to satisfy a judgment obtained in New York in 1882. The amount involved is \$121,000, with interest, and is a claim for unpaid interest on bonds of the Cincinnati, Hamilton & Indianapolis guaranteed by the above company.

The vote of this company's stockholders, made some weeks ago, to increase the capital stock \$2,000,000 and issue \$1,000,000 on bonds, to provide funds for improvements and other purposes, has been ratified at another meeting held this week. There had been some doubt as to the legality of the previous meeting.

Cincinnati & Southeastern.—On application of the Union Trust Co., of New York, trustees for the holders of the first mortgage bonds of this company, the U. S. Circuit Court for the District of Kentucky has issued a decree for the foreclosure and sale of the road. In addition to its franchises, the property consists of a narrow gauge railroad, 18 miles in length, extending from Johnson, on the Kentucky Central Railway, to Hillsboro, Ky., and the right of way and considerable construction on the line from Johnson to Covington, Ky.

Cleveland & Canton.—President Blood has issued a circular to the stockholders in which he urges the necessity of prompt action in the widening of the road's gauge, and paying off the indebtedness, as recommended in the annual report. He states that a special meeting will be called for the purpose of authorizing the issue of the new mortgage just as soon as the requisite number of shares of stock have signified their assent to the plan.

Columbus & Eastern.—The main line has been extended from Fultonham, north-westward to Zanesville, O., a distance of 11 miles. The Brush Creek Division has been opened for business from Darlington, eastward to Carmelville, O., a distance of 9 miles.

Delaware, Lackawanna & Western.—A committee has been appointed by the Elmira, N. Y., Board of Trade to wait upon the officials of this road and represent to them that the merchants of Elmira are ready to transfer their freight business to that road provided the officials should see fit to locate shops in Elmira. This is in anticipation of the removal of the New York, Lake Erie & Western shops.

This company will build a switch from Rochester, N. Y., to the works of the Retsof Mining Co., at Greigsville, a distance of 3 miles.

This company makes the following statement to the New York Commission for its leased lines in that State for the quarter ending Dec. 31:

	1886.	1885.	Inc. or Dec.	P. c.
Earnings.....	\$1,817,566	\$1,634,297	\$183,269	11.2
Expenses.....	777,791	662,114	115,677	17.5
Net earnings.....	\$1,039,775	\$972,183	\$67,592	6.9
Charges.....	525,497	541,245	D. 15,748	4.3
Surplus.....	\$514,278	\$430,938	\$83,340	21.6

Charges include all interest, taxes and rentals accruing for the quarter.

Denver Circle.—This road from Denver, Col., to the suburbs of the city has been sold, with its rolling stock, depots and engine house to Mr. F. T. Condit, of New York, representing a syndicate of New York capitalists. The consideration was \$750,000. The corporation will issue \$2,000,000 of stock, and \$1,000,000 of bonds will be issued for the purpose of funding the debt and carrying out the plans of the new owners.

Fitchburg.—This company assumed management of the Troy & Greenfield and Hoosac Tunnel on Feb. 1.

Fort Worth & Denver City.—This road will be consolidated with the Denver, Texas & Gulf, and arrangements have been completed for building a line connecting the two roads. This will make a continuous through line from Fort Worth, Tex., to the Gulf. General M. G. Dodge will be in charge of construction.

Fremont, Elkhorn & Missouri Valley.—This company has been authorized to build its road across the Fort Meade military reservation in Minnesota.

Grand Trunk.—This company has applied for an injunction to restrain the Canadian Pacific from extending its Algoma Branch along the same route through which the first-named company had purchased the right of way to Sault Ste. Marie, Mich.

Grape Creek.—This road is to be extended to St. Louis, Mo. It will cross the Illinois Central either at Tuscola, Arcola or Mattoon, Ill. The Grape Creek coal companies and the business men of Danville, Ill., are the chief projectors of the extension, and it is stated that the line when built will be operated by the Chicago & Eastern Illinois Railroad Co.

Gulf, Colorado & Santa Fe.—The line of this road will be extended from Cleburne, Tex., to Weatherford. The contract between the company and the railroad committee appointed by Weatherford citizens has been signed, and the surveyors will go into the field immediately. It is expected that trains will be running into Weatherford by next July.

Hanover Branch.—The Massachusetts Railroad Commissioners have just given a decision recommending better train service on this road.

Hillsboro Branch.—This company has filed articles of incorporation at Madison, Wis., the object being to build a line from Hillsboro to New Lisbon, Wis., via Elroy, and from Hillsboro to a point on the Chicago & Northwestern road in the eastern part of Iowa County, Wis. The total distance is 85 miles, and the line will extend through Vernon, Juneau, Richland and Iowa counties. Capital stock \$1,500,000. Work will commence this year. The Chicago & Northwestern is backing the enterprise.

Indiana, Bloomington & Western.—Application has been made to Judge Gresham to take preliminary steps toward entering a decree of foreclosure and sale of this road. On July 1, 1886, C. E. Henderson was appointed Receiver, and foreclosure proceedings taken by the Central Trust Company of New York, the trustee in the first and second mortgages, which aggregate \$9,000,000. Nearly all the bondholders have agreed on a reorganization, and the outline of a decree has been presented. The road runs from Springfield, Ohio, to Peoria, Ill., a distance of 350 miles. Governor Hoadley, of Ohio, and Mr. Joline, of New York, appeared for the Central Trust Company. C. W. Fairbanks for the Receiver, and J. D. Campbell, of New York, for the bondholders' reorganization committee. The property is said to have been well and economically managed to the satisfaction of all parties, and the decree is expected to be entered within a month.

Indianapolis, Decatur & Springfield.—The decree for the sale of this road under foreclosure has been entered in the U. S. Circuit Court at Indianapolis, Ind. The sale will take place immediately after the publication of the three months' notice required by the terms of the mortgage.

Iowa Central.—A committee of seven has been appointed to arrange plans for a harmonious readjustment of this company's debts and reorganization of the company. The committee consists of Russell Sage and Giles E. Taintor on the part of the main line; Simon Berg, for the Eastern Division; E. H. Perkins, for the Illinois Division; P. G. Thompson, for the car trusts; E. E. Chase, for the stock, and H. J. Morse. President Stickney declined to be a member of the committee, and at his suggestion Mr. Morse was chosen in his place.

Kanawha & Ohio.—This company has ordered 600 new coal cars to be used in drawing coal from the Raymond City mines in West Virginia to Chicago and the Northwest.

Kansas City & Southern.—S. C. Shaeffer has brought suit in the Criminal Court at Kansas City, Mo., against this company to recover damages for breach of contract. The contract upon which Shaeffer sues provides that he shall have one-half of the stock and bonds of the Kansas City & Southern road, owned by F. M. Green, besides holding in trust all of the bonds of the company. He was also to be the contractor of the road and to have one-third interest in leases on 20,000 acres of coal land along the line of the road, secured on condition that the line should be completed to Kansas City by January, 1885. Shaeffer alleges that this contract has been completely violated. He asks \$75,000 damages.

Louisville, Cincinnati & Dayton.—About 20 miles of this road is built between Louisville, Ky., and Springfield, O.

Louisville & Nashville.—The statement for December and the six months of the fiscal year from July 1 to Dec. 31 is as follows:

	December	1886.	1885.	Six months.	1886.	1885.
Earnings	\$1,278,905	\$1,104,212	\$7,063,188	\$6,841,917		
Expenses	749,032	690,697	4,433,686	4,151,663		
Net earnings	\$538,873	\$473,515	\$3,229,502	\$2,690,254		

For the half year the gross earnings increased \$891,271, or 12.0 per cent., and the expenses \$282,023, or 6.8 per cent., leaving a gain of \$538,873, or 20.1 per cent., in the net earnings.

Lake Erie & Western.—The following notice from J. H. Cheney, Receiver, is dated Bloomington, Ill., Feb. 1: "Notice is hereby given that the Lake Erie & Western Railway, its property and franchises have passed into the possession of Samuel Thomas, the purchaser, through his agent, Mr. Geo. L. Bradbury, the transfer being made as of Feb. 1, 1887. All officers and employees will be governed accordingly. Remittances of amounts due the Receiver will be made to the National State Bank, of Bloomington, Illinois, as heretofore."

The following notice from Samuel Thomas, Purchaser, is also dated Bloomington, Ill., Feb. 1: "The Lake Erie & Western Railroad having been sold under foreclosure proceedings by the United States Courts, and possession given to the purchaser as of this date, will hereafter be known as and operated under the name of the Lake Erie & Western Rail-

road Co. Mr. Geo. L. Bradbury is hereby appointed as my agent and General Manager, any will at once assume the duties of his position."

In Peoria, Ill., Feb. 9, articles of incorporation were filed for the reorganized company. The articles provide for the extension of the road from Bloomington to Peoria. The incorporators are Columbus R. Cummings, James High, John B. Cohrs, of Chicago, and Calvin S. Brice and Samuel Thomas, of New York.

Long Island.—The statement for the quarter ending Dec. 31, 1886, as submitted to the Railroad Commission, shows:

	1886.	1885.	Inc. or Dec.	P. c.
Earnings	\$643,457	\$615,061	L. \$28,396	4.6
Expenses	419,942	392,655	L. 27,287	6.9
Net earnings	\$223,515	\$222,406	L. \$1,109	0.5
Other income	23,876	22,998	L. 878	3.8
Total	\$247,391	\$245,404	L. \$1,987	0.8
Charges	151,908	158,233	D. 6,325	4.0
Net income	\$95,473	\$87,171	L. \$8,302	9.5

The usual dividend of 1 per cent. for the quarter was paid, requiring \$100,000. The December quarter on this road usually shows the highest earnings of the year.

Mason City & Fort Dodge.—This road has been opened for business from Mason City, southward to Fort Dodge, Ia., a distance of 72 miles, with branch lines from Round House to Lehigh, 15 miles, and from Carbon Junction to Coalville, Ia., 5 miles.

Minneapolis, Lake Shore & Western.—The Pence Branch has been opened for business from Hurley to Pence, Wis., a distance of 6 miles.

Minneapolis, Sault Ste. Marie & Atlantic.—This company has made an agreement by which it will build, in conjunction with the Canadian Pacific and the Duluth, South Shore & Atlantic, the bridge over the River St. Mary at Sault Ste. Marie, Mich. When the Grand Trunk gets its line to the Sault it will also be taken into the company. Work will begin immediately. The bridge will be a steel structure costing \$560,000.

Minnesota & Northwestern.—The Illinois line of this road has been leased to the Minnesota Division for a period of 999 years. A mortgage has been filed in the Illinois counties, under which the Minnesota can borrow not more than \$10,000 per mile on the company's line in Illinois.

President Stickney has effected a temporary arrangement by which the train of this road will run into Galena, Ill., from East Dubuque over the Chicago, Burlington & Northern track.

Mississippi & Tennessee.—The holders of the consolidated mortgage bonds, series A and B, of this company, met this week at the office of the President, Mr. E. H. Harriman, to discuss the financial condition of the company. The interest on the bonds due on Jan. 1 had not been paid till a month later. Statements were submitted to those present showing the certainty of further delays in the payment of interest. The statements may be made public as soon as they can be definitely formulated. Another meeting was ordered for Feb. 28.

Montreal, Portland & Boston.—The Hatton party has succeeded in obtaining possession of this company's books by seizing them when they were brought into court on a subpoena. This is an object that has long been sought after.

New Jersey Junction.—Vice-Chancellor Bird has restrained the Mayor and Aldermen of Jersey City, N. J., from interfering with the construction of the tracks of this company across 6th street in that city.

Newport News & Mississippi Valley.—Notice has been given that the line of trans-Atlantic steamships now established by this company between Newport News, Va., and Liverpool, Eng., will hereafter be known as the Huntington Steamship Line.

New York Arcade.—Justice Van Brunt, in the Supreme Court at New York, has handed down a decision sustaining this company in the suit brought against it by John Jacob Astor, O. B. Potter, and other Broadway property owners, who sought to prevent it from building an underground road. The case will probably be carried to the Court of Appeals.

New York, Chicago & St. Louis.—A plan for the reorganization of this company has been perfected, and E. P. Olcott, President of the Central Trust Co., William K. Vanderbilt, J. A. Roosevelt and John S. Kennedy will act as a committee to carry it into effect. Holders of over \$1,500,000 bonds have assented to the plan. It is proposed to form a new corporation which will issue the following stocks and bonds:

\$20,000,000 gold bonds, maturing Jan. 1, 1937, bearing interest at the rate of four per cent. per annum until three months default in payment of interest, in which event the bonds are to bear interest at the rate of six per cent. per annum from the date of default, the bonds to be secured by a first mortgage on all the property, including equipment, owned by the corporation at the date of the bonds or afterward acquired by it, and which mortgage shall provide for a sinking fund of \$100,000 each year, which shall be a first charge after payment of interest on outstanding first mortgage bonds.

\$5,000,000 first preferred stock, entitled to a non-cumulative dividend of not more than 5 per cent. per annum after payment of fixed charges.

\$11,000,000 second preferred stock, entitled to a like dividend after payment of fixed charges and a dividend on first preferred stock.

\$14,000,000 common stock, entitled to a like dividend after payment of fixed charges and dividends on first and second preferred stock. Net earnings thereafter to be applicable to payment of dividends without discrimination among classes of stock.

These securities will be distributed among the parties to the agreement as follows:

To the holders of old first mortgage bonds, or Central Trust Company receipts heretofore issued, and second mortgage bonds outstanding, first mortgage bonds of the new company, the principal of which shall be equal to 112 per cent. of the principal of the old first mortgage bonds and 110 per cent. of the principal of the outstanding second mortgage bonds, and there shall be paid in cash at the time of the delivery of said new bonds interest at the rate of 4 per cent. per annum from Dec. 1, 1886, to the date of such new bonds.

To the holders of old preferred stock who shall have paid, as provided in said agreement, an assessment of \$10 per share, an amount of new first preferred stock equal at par to the cash assessment, and an amount of second preferred stock equal at par to 50 per cent. of the par value of old preferred stock.

To the holders of old common stock who shall have paid

the like assessment, new first preferred stock, equal at par to the cash assessment and an amount of new common stock equal to 50 per cent. of the par value of the former common stock.

To such holders of claims as may become parties to the agreement, bonds of the new company to the amount of the claims with interest, or cash, at the option of the reorganization committee.

The questions that for months have vexed the holders of this company's bonds are now in the way of settlement under a plan, the substantial features of which are as follows:

The property will be covered by the issue of \$20,000,000 of 4 per cent. bonds, to run for 50 years. These bonds must stand on their own merit, without guarantee from the Lake Shore & Michigan Southern. The fixed charges under the new plan will be \$800,000 a year. Whenever the road may earn in any year \$900,000 or more, \$100,000 must be turned into the sinking fund for the payment of the bonds at 102, if that figure will buy them. When the earnings do not reach so much or the bonds cannot be bought at 102, the sinking fund will lapse for that year. The present bonds will receive 112 in new bonds, and the stockholders will pay an assessment of 10 per cent., or \$5,000,000, their present holdings being converted, at one-half their face value, into new stock. Preferred stock will be issued for the amount of the assessment. This will leave the company with \$3,200,000 of first-mortgage bonds, \$5,000,000 cash, and surplus earnings of \$1,000,000 now in the hands of the Receiver. All the road's obligations will thus have been met, and the road will be fully equipped anew and put in first-class order. Foreclosure proceedings under the plan will begin at once.

Receiver Caldwell reports to the Court for the quarter ending Dec. 31 as follows: Total receipts, \$2,542,453; disbursements, \$1,600,254; balance cash on hand, \$942,202.

The application of H. B. Hollins to the Court for the possession of the original cognovit notes, one for \$250,000, the other for \$1,750,000, on which judgments were given on Sept. 21, 1885, has been granted.

New York, New Haven & Hartford.—The directors have decided to build a new bridge on the Shore Line road in place of the one now spanning the Connecticut River at Lyme, Conn. It is understood that the bridge will be of iron on stone piers, placed about 80 rods north of present structure. Work will begin this spring.

The statement to the New York Commission for the quarter ending Dec. 31 is as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Earnings	\$1,953,355	\$1,844,599	L. \$108,756	5.9
Expenses	1,777,128	1,180,595	L. 99,533	8.2
Net earnings	\$676,227	\$663,934	L. \$12,293	1.8
Other income	6,146	11,096	D. 4,950	44.8
Total	\$682,373	\$675,030	L. \$7,343	1.1
Charges	214,947	104,047	L. 110,900	4.2
Surplus	\$467,426	\$470,983	D. \$3,557	0.6

From the surplus the usual dividends, at the rate of 10 per cent. yearly, have been paid.

New York, Philadelphia & Norfolk.—This company will endeavor to perfect a pool with the water lines running out of Norfolk, Va., to the north, at a meeting to be held in New York, Friday, Feb. 11.

Northern Pacific.—The statement for December and the half-year from July 1 to Dec. 31 is as follows:

	December.	1886.	1885.	Six months.	1886.	1885.
Earnings	\$899,635	\$775,371	\$7,342,294	\$6,741,270		
Expenses	515,857	468,820	3,372,168	3,102,289		
Net earnings	\$383,778	\$306,551	\$3,970,126	\$3,638,981		
Interest, rentals, etc.			3,143,206	3,010,011		
Surplus			\$826,920	\$628,970		

The total funded debt (including \$475,500 bonds in sinking fund) on Dec. 31 was \$74,453,321. The preferred stock outstanding on that date was \$37,936,767.

Land sales for the half year in 1886 were 145,755 acres; amount of sales was \$507,706, including town-lots.

Oregon Railway & Navigation.—A bill granting a franchise for the construction of a new bridge by this company over the Willamette River at Portland, Oregon, has passed the Legislature of that state.

Pennsylvania.—A conference was held in Philadelphia by the heads of all the departments of this road and the different branches of the freight service to discuss the Interstate Commerce Bill. It is said that the bill will change a system of freight service that has been in vogue for 25 years. It will create a new department for the government that will involve the employment of 500 clerks. The return to the commissioners of all contracts made by the railroads will necessitate the sending by this company to Washington of 500 contracts a day.

Mr. Edgar Miller, owner of the Miller patent railroad car coupling, has begun suit against this company for \$800,000 for infringement of patent.

Perry County.—A charter has been issued for this company in Pennsylvania to build a road from New Bloomfield in Perry County to the Juniata River, at or near its mouth. The length of the road will be about 11 miles. Capital stock \$100,000.

Philadelphia, Wilmington & Baltimore.—This company will this week give out a contract for the building of 4½ miles of double track from their line at Edge Moor, north of Wilmington, Del., to their line at Delaware Junction, south of Wilmington. The new branch will cross the Christiana River twice, an 800 ft. span near its mouth and a 600 ft. span two miles further up the stream. It will be known as the Shellpot Branch.

Pittsburgh & Western.—The receivers of this company have filed a petition in the U. S. District Court at Pittsburgh, asking to be allowed to contract with the Harrisburg Car Co. for 450 cars, which are required by the increased freight business of the road.

Pontiac, Oxford & Port Austin.—Mr. E. B. Martindale, of Indianapolis, Ind., Receiver of the New York, New England & Western Investment Co., has filed a bill of complaint at Detroit, Mich., against officers of the above railroad company, and asks that a Receiver be appointed to manage the affairs of the road. It is claimed that an agreement was made in 1881 by which the investment company was to build and equip 100 miles of road between Pontiac, Mich., and Caseville. For this the company was to receive all the first mortgage bonds and shares of capital stock, which were to be issued at the rate of \$15,000 per mile. At the time of the contract the capital stock of the investment company was \$1,000,000 in cash. It expended in the construction of the road about \$1,312,000, of which \$400,000 was appropriated for the capital stock of the investment company through Joseph E. Hale, who was then President and also a director of the investment company.

It is alleged that as soon as the bonds and shares of the

road company were received they were taken possession of by Hale, for the purpose of securing him for money which he claimed to have loaned the investment company. Hale has since died, and the bonds are now in the hands of the executor of his estate. It is asked that the franchise and property of the railroad be declared an asset of the investment company; that these may be sold and an accounting had, for which a receiver should be appointed; that the executor of Hale's estate be enjoined from selling the \$1,500,000 bonds and stock which is claimed to be held by them as security for money loaned the investment company by Hale.

Philadelphia & Reading.—The Receiver's report for December, the first month of the fiscal year, which does not include the New Jersey Central, gives the earnings of the railroad lines as follows:

	1886.	1885.	Decrease.	P. c.
Earnings.....	\$1,578,714	\$1,648,777	\$70,063	4.4
Expenses.....	908,432	917,990	9,557	1.0
Net earnings.....	\$669,282	\$730,778	\$61,496	8.5

The decrease in both gross and net earnings is considerable.

The traffic for the month was as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Tons coal.....	702,495	751,199	D. 48,704	6.9
Tons merchandise.....	718,343	685,083	I. 33,260	4.8
Passengers.....	1,205,817	1,180,039	I. 25,778	2.2
Tons coal on colliers.....	33,107	45,126	D. 12,019	26.9

There was a decrease in coal, but an increase in general business.

The earnings of the Coal & Iron Co. for the month were as follows:

	1886.	1885.	Decrease.	P. c.
Earnings.....	\$1,342,524	\$1,315,258	\$27,266	2.1
Expenses.....	1,364,173	1,420,828	56,655	4.0
Deficit.....	\$21,649	\$75,570	\$53,921	71.3

In this case the decrease in expenses was large enough to reduce the deficit materially.

The coal mined from the company's lands was:

	1886.	1885.	Decrease.	P. c.
By Co.....	439,682	495,746	56,064	11.3
By tenants.....	46,162	74,069	27,907	37.7
Total.....	485,844	569,815	83,971	14.7

The joint net earnings of the two companies were as follows:

	1886.	1885.	Decrease.	P. c.
Railroad Co., net.....	\$669,282	\$730,778	\$61,496	8.5
Coal & Iron Co., deficit.....	21,649	75,570	53,921	71.3
Total, net.....	\$647,633	\$655,208	\$7,575	1.3

As the expenses include no charge for interest and rentals, the net earnings give the amount from which all charges are to be met.

Pontiac & Pacific Junction.—It is said that the directorate of this road are considering a proposition to extend the road from Sault Ste. Marie, Mich., there forming a connection with the Northern Pacific. It is claimed that this would be the shortest available route between the West and Boston and New York. An independent line will have to be built from Aylmer, P. Q., to Hull and a bridge over the Ottawa River connecting Hull with Ottawa.

Ripley & Mill Creek Valley.—This road is building along the Valley of Mill Creek, which empties into the Ohio River 44 miles below Parkersburg, W. Va. At that point it connects with the Ohio River road. The present terminus of the road is Ripley, the county seat of Jackson County. It is the intention of the company to extend the road to Spencer, in Roane County, and also to pass through the counties of Jackson and Kanawha to Charleston, W. Va., making the distance by rail from Parkersburg to Charleston 94 miles, a saving of 50 miles over the river routes. Two districts in Jackson County have subscribed their bonds to the amount of \$30,000 to aid in the construction of the road. Contracts for the ties, bridges and trestle-work have been let, and the work is being rapidly pushed. The company hopes to secure sufficient iron and rolling stock to equip the road at an early day.

Rome, Watertown & Ogdensburg.—Several hundred section men have been put at work on the line of the proposed extension of this road from Vincent Place in Rochester, N. Y., to the bank of the Genesee River. The company owns the property along the route, but the appropriation of it occasions considerable of a tempest among residents whose houses are being knocked down and dispersed. The work is likely to progress without interruption.

The report heretofore published that "The sum of \$23,127 has been levied on the real estate in the town of Lewiston, N. Y., to pay judgments obtained against this company on old bonds," is without any foundation whatever, and was apparently of malicious origin. The company is paying the interest on all its bonded indebtedness promptly as it matures, and will, on Feb. 15, pay a 2½ per cent. dividend on its stock.

It is reported that this company will build a new repair shop and engine house at Richland, N. Y.

The Civic Executive Board of Rochester, N. Y., has sent a letter to the State Railway Commission requesting the latter to interfere in the matter of laying track on the Vincent Place extension.

St. Croix River.—A petition has been presented to the Maine Legislature by a party of men who ask to be incorporated into a railroad company bearing the above name, with the view of running a line from some point on the St. Croix River in the city of Calais, Me., through the towns of Robinson and Perry to some point in Eastport, Me. The stock shall not exceed 20,000 shares of \$100 each.

St. Louis, Arkansas & Texas.—This company has commenced the survey of its line from Bud's Point, Mo., to St. Louis. The surveyors will move up the west side of the Mississippi River till they reach a point opposite Grand Tower, Ill., where they will separate, and one-half of them come up on the east side of the river to East St. Louis.

St. Louis, Iron Mountain & Southern.—This company proposes to pay into the Arkansas State Treasury, \$350,000 for back taxes.

St. Louis, Wichita, Hays City & Southwestern.—A charter has been issued to this company at Topeka, Kan. The object of the corporation is to build a standard gauge road for connection with St. Louis, Mo., and Wichita, Kan., through the counties of Sedgewick, Reno, Stafford, Rice, Barton, Rush, Rook, Ellis, Phillips, Graham, Norton and Decatur in the State of Kansas. Capital stock, \$2,000,000.

Schuylkill Navigation Co.—This company held its annual meeting in Philadelphia this week. The manager in his report complains of the dilatory methods of the Philadelphia & Reading receivers in settling the claims of his company against that road. He stated that the company had received an offer of \$1,000,000 in cash and a reconveyance of certain parts of its real estate, in consideration of which the loanholders and stockholders were to be asked to cancel the lease of the canal and works to the railroad company and relieve it from all claims and guarantees. This offer could not be recommended for acceptance. The financial statement to

Jan. 1 shows an indebtedness of \$13,867,595.99 and credits of the same amount. This includes a bill for rent against the Philadelphia & Reading of \$1,287,993.17. For contingent and sinking fund the same company is indebted \$36,268.58, and for works and estates of the company leased to the railroad company \$13,472,300.36. The cash on hand is \$44,745.01. A resolution was voted "that the president and managers be authorized to enforce the claims of the company in behalf of all its loan and stockholders in such a manner as may seem best to them to preserve and enforce the rights of this company against the property of the Philadelphia & Reading Railroad Company and its receivers."

South Atlantic & Ohio.—This road has been opened for business from Bristol, Tenn., westward to Mendota, Va., a distance of 15 miles.

Southern Maryland.—Chief Engineer A. Stiles is making observations along the graded line of this road between Mechanicsville and California, St. Mary's County, Md., and he says that the road will be completed to St. Mary's City during the coming summer. A large wharf will be erected at the St. Mary's terminus, where several thousand acres of land have been purchased.

Tennessee & Sequatchee Valley.—The name of this road has been changed to the Tennessee Central Railroad. It is in operation from Spring City, Tenn., on the Cincinnati Southern, to Grand View, 5 miles.

Terre Haute & Peoria.—The new owners of the Illinois Midland property have made the second payment, and the Dow interests have been given the deed to the property. The payment just made is \$600,000, the first being \$300,000. The balance due is about \$200,000. E. H. Conklin, the Vice-President, will manage the road. The company wishes to secure right of way through one of the streets of Decatur, Ill., so as to obviate the rental of the Illinois Central track to Maroa, a distance of 14 miles.

Toledo, Saginaw & Muskegon.—At a meeting held in Detroit, Mich., a resolution was adopted approving of the placing of a mortgage for \$1,600,000 on the company's property to carry out the plans looking to the early completion of the entire line from Saginaw to Muskegon, Mich. A portion of the line will be open for traffic by July next, and the entire line completed early in the fall. About 20 miles of the road is graded and ready for the ties. The distance from Ashley to Greenfield is under contract and the contract for the remainder will be let immediately.

Union Pacific.—This company will cease the issue of all complimentary passes as soon as the Interstate law goes into effect. This applies to every species of free travel.

Wabash, St. Louis & Pacific.—The Purchasing Committee has made arrangements for the transfer of the Western Division of this road to the new company on March 1, at which time the Receiver will be relieved entirely of the system leading into St. Louis from the West. The Eastern Division will remain for an indefinite period under the control of Receiver Cooley and Judge Gresham.

West Branch & Moorestown.—This road has been opened for business from Moorestown to Riverside Junction, Mich., a distance of 10 miles. It is a logging road.

Western & Atlantic.—This Georgia Company has increased the wages of its employees 5 per cent., thus keeping the promise made two years ago when a like reduction was made, that wages should be restored when an increase of business would permit.

West Virginia Central & Pittsburgh.—A bill is before the Legislature of West Virginia for extending the power of this company so that it can operate its lines down the Monongahela River to the Southern boundary of Pennsylvania. It also gives the privilege of making a connection with the Chesapeake & Ohio, the Washington & Ohio, the Richmond & Allegheny, the Kanawha & Ohio, or any other road now constructed or to be built hereafter.

ANNUAL REPORTS.

Denver & Rio Grande Western.

This company owns a line from Ogden, Utah, to the Colorado line, 310 miles, with 58 miles of branches; a total of 368 miles. The statement is for the year ending Dec. 31.

The earnings for the year were as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Earnings.....	\$1,051,900	\$1,021,089	I. \$30,811	3.0
Expenses.....	704,102	713,589	D. 9,487	1.3
Net earnings.....	\$347,798	\$307,500	I. \$40,298	13.1
Gross earn. p. mile.....	2,853	2,775	I. 78	0.3
Net ".....	945	838	I. 107	13.1
Per cent. of exps.....	66.9	69.9	D. 3.0	

Interest charges last year amounted to \$253,500, leaving a surplus of \$94,298 for the year.

Milwaukee, Lake Shore & Western.

This company owns a line from Milwaukee, Wis., to Ashland, 397 miles, with 159 miles of branches; a total of 556 miles. There were 23 miles of branches added last year. The statement is for the year ending Dec. 31.

The earnings for the year were as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Earnings.....	\$2,317,905	\$1,365,278	I. \$952,627	69.8
Expenses.....	1,338,890	914,388	I. 424,502	46.4
Net earnings.....	\$979,015	\$450,890	I. \$528,125	132.6
Gross earn. p. mile.....	4,292	2,677	I. 1,615	60.3
Net ".....	1,813	935	I. 878	119.8
Per cent. of exps.....	57.7	69.3	D. 11.6	

Receipts from other sources last year were \$36,182, making the total net \$1,015,237. Interest and rental charges (including interest on income bonds) were about \$580,000, leaving a surplus of \$435,237, which was equivalent to 7 per cent. on preferred and 4 on common stock.

Chicago & West Michigan.

This company owns a line from La Crosse, Ind., to Pentwater, Mich., 393.7 miles, with 204.8 miles of branches; a total of 418.5 miles. The statement is for the year ending Dec. 31.

The earnings for the year were as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Earnings.....	\$1,391,990	\$1,297,401	I. \$94,589	7.6
Expenses.....	1,021,491	948,513	I. 72,978	8.1
Net earnings.....	\$370,499	\$348,888	I. \$21,611	6.2
Gross earn. p. mile.....	3,374	3,117	I. 257	7.6
Net ".....	893	843	I. 50	6.2
Per cent. of exps.....	73.5	73.1	D. 0.4	

Interest charges amounted to \$215,763, leaving a surplus of \$154,736. From this surplus dividends of 3½ per cent. have been paid, amounting to \$153,755, leaving a balance of \$964 to profit and loss.

Kansas City, Fort Scott & Gulf.

This company owns a line from Kansas City to Springfield, Mo., with numerous branches, 388.66 miles in all. The statement is for the year ending Dec. 31.

The earnings for the year were as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Earnings.....	\$2,339,338	\$2,516,520	D. \$177,182	0.3
Expenses.....	1,475,527	1,558,907	D. 83,380	5.2
Net earnings.....	\$1,063,811	\$957,613	I. \$106,198	11.2
Gross earn. p. mile.....	6,533	6,552	D. 19	0.3
Net ".....	2,734	2,543	I. 191	7.6
Per cent. of exps.....	58.1	61.2	D. 3.1	

Interest and other charges last year were \$625,941, leaving a surplus of \$437,870. From this surplus 8 per cent. on preferred and 4 per cent. on common stock were paid, amounting to \$405,880, leaving a balance of \$31,990 to profit and loss.

Grand Rapids & Indiana.

This company owns a line from Fort Wayne, Ind., to Petoskey, Mich., 366.6 miles, with 36.9 miles of branches; a total of 403.5 miles. The statement is for the year ending Dec. 31.

The earnings for the year were as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Earnings.....	\$2,078,500	\$1,946,143	I. \$132,357	6.8
Expenses.....	1,331,687	1,342,428	D. 10,741	0.8
Net earnings.....	\$746,813	\$603,715	I. \$143,097	23.7
Gross earn. p. mile.....	5,151	4,908	I. 243	4.9
Net ".....	1,851	1,523	I. 328	21.8
Per cent. of exps.....	64.1	69.0	D. 4.9	

The interest charges last year were \$715,600, leaving a surplus of \$31,222 for the year, against a deficit of \$110,384 in the previous year.

Delaware & Hudson Canal Co.

This company owns a canal from Honesdale, Pa., to Rondout, N. Y., 108 miles. It owns 215 and leases 475 miles of railroad and also owns and works extensive coal properties in the anthracite regions in Pennsylvania. The report is for the year ending Dec. 31.

The company mined and sold last year 3,480,687 tons of coal, an increase of 164,994 tons, or 5 per cent. over 1885. The prices received for coal were generally lower.

The income account for the year is as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Coal.....	\$7,081,843	\$7,201,049	D. \$119,206	1.7
Railroads.....	8,239,740	7,230,358	I. 1,009,382	13.9
Miscellaneous.....	692,277	829,400	D. 137,123	16.5
Total.....	\$16,013,860	\$15,260,807	I. \$753,053	5.0
Expenses.....	11,422,854	10,724,907	I. 697,947	6.5
Net earnings.....	\$4,591,012	\$4,535,900	I. \$55,112	1.2
Charges.....	3,415,620	3,349,564	I. 66,056	1.9
Net profit.....	\$1,175,392	\$1,186,336	D. \$10,944	0.9

Charges include interest, taxes and rentals. The net profit last year was equivalent to 4.8 per cent. upon \$24,500,000 capital stock.

Troy & Greenfield.

This road, which includes the Hoosac Tunnel and is owned by the state of Massachusetts, extends from Greenfield, Mass., through North Adams to the Vermont line, 44 miles. The report of the Manager is for the year ending Sept. 30.

The road has been worked for several years under an arrangement by which all connecting lines ran trains over it, paying the state 50 per cent. of the gross receipts as toll. The state provided only the maintenance of way.

The road has recently been sold to the Fitchburg Railroad Co., as noted in our columns.

The income for the year was as follows:

	1886-86.	1885-85.	Inc. or Dec.	P. c.
Tolls.....	\$350,181	\$276,692	I. \$73,489	26.5
Other sources.....	33,583	36,590	D. 3,007	8.1
Total.....	\$383,764	\$313,282	I. \$70,482	22.5
Expenses.....	270,418	261,757	I. 8,661	3.3
Net earnings.....	\$113,346	\$51,525	I. \$61,821	120.0

The expenses were made up as follows: Operating, \$251,863; performing service for other roads for which payment has been collected, \$18,556; total, \$270,418.

Last year 197,470 freight cars passed through the tunnel, of which 185,892 were loaded. The total traffic was 360,255 passengers carried 6,529,609 miles, and 1,723,205 tons of freight carried 67,648,556 miles; the average rate being 2.19 per passenger mile and 0.80 cent per ton-mile.

The train mileage on the road was: Fitchburg trains, 379,884; New Haven & Northampton, 75,705; Troy & Boston, 44,905; Boston, Hoosac Tunnel & Western, 77,557; service and switching, 156,780; total, 734,831 miles.

Maryland Central.

This company owns a line from Baltimore, Md., to Delta, Pa., 45 miles. It is operated by a receiver, pending foreclosure. The report is for the year ending Dec. 31.

The earnings for the year were as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Earnings.....	\$128,540	\$137,722	D. \$9,182	8.1
Expenses.....	100,311	124,937	D. 24,626	19.5
Net earnings.....	\$28,229	\$12,785	I. \$15,444	100.3
Gross earn. p. mile.....	2,812	3,000	D. 188	8.1
Net ".....	583	291	I. 292	100.3
Per cent. of exps.....	79.3	90.5	D. 11.2	

No interest was paid on the \$600,000 first and \$300,000 second mortgage bonds. Interest was paid on the car-trust notes and receivers' certificates.

Expenditures for improvements were \$15,709 and the Receiver is applying all surplus funds to putting the road in good condition, much of it having been very poorly built.

Huntingdon & Broad Top Mountain.

This company owns a line from Huntingdon, Pa., to Mt. Dallas, 45 miles, with 19 miles of coal branches. The report is for the year ending Dec. 31.

The earnings for the year were as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Earnings.....	\$379,874	\$371,001	I. \$8,873	2.4
Expenses.....	157,139	179,292	D. 22,153	12.3
Net earnings.....	\$222,735	\$191,709	I. \$31,026	16.2
Gross earn. p. mile.....	5,936	5,797	I. 139	2.4
Net ".....	3,480	2,935	I. 545	18.9
Per cent. of exps.....	41.4	48.5	D. 7.1	

Last year the road carried 892,198 tons of freight, of which 385,797 tons were Broad Top coal, and 266,154 tons were Cumberland coal.